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THE

NATURE AND TREATMENT

OF

DISEASES OF THE EAR.

BY DR. WILLIAM KRAMER.

SECOND EDITION OF THE AUTHOR'S TREATISE ON CHRONIC DEAFNESS, MUCH IMPROVED AND ENLARGED.

TRANSLATED FROM THE GERMAN,

WITH

THE LATEST IMPROVEMENTS OF THE AUTHOR SINCE THE LAST GERMAN EDITION.

BY JAMES RISDON BENNETT, M.D.

MEMBER OF THE ROYAL COLLEGE OF PHYSICIANS OF LONDON; LATE SENIOR PRESIDENT OF THE HUNTERIAN MEDICAL SOCIETY OF EDINBURGH; MEMBER OF THE ROYAL MEDICAL SOCIETY OF EDINBURGH, AND OF THE HUNTERIAN AND MEDICAL SOCIETIES OF LONDON, AND PHYSICIAN TO THE GENERAL DISPENSARY, ALDERSGATE STREET.

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TRANSLATOR'S PREFACE.

A SYSTEMATIC treatise on Diseases of the Ear, at once scientific and practical, has long been felt to be a great desideratum in British medical literature. Believing the treatise of Dr. Kramer to merit the reputation which it has already acquired, to deserve the attention of the profession, and to be calculated to supply an acknowledged deficiency, I have presented it to the public in an English dress.

Accuracy of diagnosis, and luminous descriptions of the diseases of which it treats, are among the chief merits of Dr. Kramer's work. It would not, therefore, have much enhanced the value of the present translation, had I appended to it the views of others, founded on cases, the diagnosis of which was deficient. A few instances in which it appeared to me that the Author's spirit of criticism (generally very just) had carried him too far, I have deemed it a duty to notice.

The additions with which Dr. Kramer has favoured me, since the publication of the last German edition, have been incorporated with the text.

The last work which has appeared on this subject, is a very elaborate German treatise, by Dr. Chas. Gustavus Lincke, of Leipsic, entitled "A Manual of Theoretical and Practical Acoustic Medicine." The first part, only, is yet published, in a large and very thick 8vo. volume, comprising the Anatomy, Physiology, and Morbid Anatomy of the Ear, illustrated by numerous lithographic plates. I have not had an opportunity of doing more than glance at this volume, whilst the last sheets of the present translation were passing through the press; but this I the less regret, as it does not contain the practical part of the subject.

Our indefatigable German neighbours are evidently rousing themselves to remove the opprobrium that has hitherto attached to acoustic medicine. In our own country the treatment of aural diseases has fallen almost entirely under the care of a class of persons who have no pretensions to scientific information. All that is required in order to render the treatment of these diseases comparatively satisfactory, and thus restore them to the care of well qualified practitioners, is a little manual dexterity in the introduction of the catheter, and careful local investigation of the affected organ. Hence will result a more deep conviction of the paramount importance of detecting and arresting diseases of the ear at their onset, before they have

given rise to those organic changes which are beyond the reach of art. Should the present translation of Dr. Kramer's treatise contribute to these results, I shall feel amply rewarded for my labour.

With respect to the translation, I have endeavoured to be as faithful to the original as was consistent with perspicuity, sacrificing every minor object to that of giving as far as possible the full meaning of the author.

1, *Dalby Terrace, Islington,*
September, 1837.

AUTHOR'S PREFACE.

RELYING on the interest shown by the medical and non-medical public, in my "Practical Observations on the Nature and Treatment of Chronic Deafness," published three years ago, I now venture to put it forth as a new work, much more complete, and I trust, much improved. It is no longer a fragment—a work on the important Chronic Forms of Diseases of the Ear; but an exposition, as complete as possible, of Systematic Acoustic Medicine; for which I am the more desirous of an indulgent reception, in consequence of having myself spared neither time nor pains, in order to render available, for the better understanding of the subject, the mass of materials afforded me by an extensive practice.

The former part, on General Acoustic Medicine, contains, in the first place, a Critical Survey of the literature extant on the subject; in which no one will accuse me of unfairness, for having altogether omitted any notice of many small Essays and Memoirs, of both ancient and modern

date, (*e.g.* the academic writings of Eschke, Daun, Troschel, Lobethal, and others,) on account of their total want of scientific importance. A careful critical examination was, however, indispensably necessary, for the most erroneous views are almost universally entertained, even with regard to the value or worthlessness of many works on acoustic medicine. The censure which I have found it necessary to pass (though this is occasionally given merely in its results,) will be found amply confirmed in the respective passages of the second part.

The remaining portion of the former part, examines conjointly questions of importance to the General Pathology and Therapeutics of Diseases of the Ear, in which the lamentable errors of both ancient and very recent times, in the treatment of Diseases of the Ear, are distinctly and clearly pointed out.

In this respect, the first part is of the utmost importance to every medical practitioner who wishes to make himself familiar with the manual part of Acoustic Medicine; and without the most accurate knowledge of the manual part, he ought not to treat any disease of the ear, if he would avoid doing injury when he cannot render aid.

The annexed tabular view of the frequency and curability of diseases of the ear, as well on account of its novelty as of the results it affords, will not appear unimportant.

In the second part, containing Special Acoustic Medicine, there is unfolded, in the first three chapters, a comprehensive, and, I trust, a natural system of all diseases of the

ear, the arrangement of which has been determined according to the structural alterations of the parts of the organ affected.

To a large number of cases, which, with very few exceptions, have been taken from my own journal, I have endeavoured to attach the greatest possible degree of credibility, by annexing the names of the patients. This I was especially authorised to do, in many cases, by the patients themselves, whilst those whose authority has not been particularly requested, cannot censure the publicity thus given to their names; inasmuch as this is done with a view to a scientific object. Nothing but circumstances altogether peculiar obliged me, in particular cases, to withhold the name.

In the fourth chapter, I give the necessary information respecting the trifling utility (and even this is always very doubtful) of the employment of ear-trumpets by those who hear with difficulty. Finally, in the fifth chapter, there are convincing proofs of the entire failure of all remedial attempts hitherto made for the restoration of the faculty of hearing in deaf-mutes, whence I am much disposed to prognosticate similar results, from any remedial attempts that may in future be made for the same purpose. The deaf-dumb, whether they be completely deaf, or merely dull of hearing, are incurable.

Dr. WILHELM KRAMER,

Rosstrasse, No. 29.

Berlin, December, 1835.

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DISEASES OF THE EAR.

PART I.

GENERAL ACOUSTIC MEDICINE.

CHAPTER I.

CRITICAL LITERARY REVIEW AND GENERAL CONSIDERATIONS ON DISEASES OF THE EAR.

MANKIND have often imposed on themselves the ungrateful task of complaining of the neglect with which diseases of the ear have, up to the present time, been treated, both by authors and practitioners. There was, indeed, good ground for such complaints, when one compared the number and utility of the works which treat of the diseases of the ear on the one hand, and of those of the eye on the other, and the very disproportionate superiority of the latter was remarked; and when, farther, it was considered, that the organ of sight, in its influence on the mental and intellectual life of man, is certainly rather inferior than even equal to that of hearing. Yet it was quite unjust to complain, as long as no improvement was made in what our predecessors had left to be improved, and no attention was paid to the consideration, that the great variety of ophthalmic diseases, in conjunction with the clear, transparent structure of the eye, must, at all times, have irresistibly attracted the observer, and promised him rich and certain recompense, which from the concealed situation of the ear, even after the most laborious investigation, must still always be very doubtful.

I propose, therefore, to enter on the present work, not with any useless complainings, but with a view of presenting to the reader a chronologically arranged survey, as complete as possible, of the more important labours in the department of acoustic medicine; in order thus to allow my opinions on these works in some measure to unfold themselves to view. But my principal object is, (and I freely confess that I consider this as an important result of my labour) to deprive those authorities which have hitherto been falsely considered the highest, of the support of long established veneration, in the hope of thus obtaining for better authorities a more general acknowledgment than has hitherto been accorded.

I am desirous, also, of declaring, beforehand, that this improvement in acoustic medicine is but of the most recent date, and that its tardy appearance is principally to be attributed to the neglect with which the investigation of the ear, in its diseased state, has hitherto been treated, whence must necessarily have arisen uncertainty as to the nature, and want of plan in the treatment of the diseases of this delicate organ of sense.

§ 1. *Critical Literary Review.*—I begin with the writings of Hippocrates, although in these there is scarcely any mention made of diseases of the ear, as independent, idiopathic forms of disease. To the physician of Cos they were of particular importance, only as accompaniments of other diseases, especially of febrile and acute complaints; viz. so far as they afforded important prognostics for the favourable or unfavourable termination of the latter. It is entirely in this sense (*a*) that he mentions deafness, singing in the ears, tumours behind the ears, discharges from them, and a cold, pellucid, and contracted state of the auricles; but always, only in connection with other highly important symptoms, with delirium, paralysis, sweats, and alterations of the urine, &c. He describes, as especially dangerous, pains in the ear associ-

(*a*) Coacæ, Prænotiones, and Aphorismi.

ated with violent fever, which can be relieved only by a copious discharge of pus from the ears, or bleeding from the nose.

If by "tumours behind the ears, which must pass into suppuration, or be dispersed by copious diarrhœa, if they are not to prove fatal," we are to understand otitis interna, and its terminations, and carious destruction of the mastoid process, as a result of the otitis interna, and if, farther, I mention that the treatment of deafness, (viz. as it occurs as a functional disorder, only, of the ear, without any perceptible external alteration of the organ) merely consists(*b*), in not washing out the ear, but cleansing it with wool, dropping in oil, directing the patient to walk out, rise early, drink white wine, abstain from salads, and allowing him to eat bread and such fish as inhabit rocky shores, I shall have collected all that is of most importance to give an idea of the state of acoustic medicine at that time.

Celsus (*c*) laid the foundation for a scientific development of this branch of the medical art; for he first represented diseases of the ear as entirely independent forms of disease; gave excellent rules of conduct in the treatment of the more acute inflammations of the ear; advised ocular inspection of the auditory canal in chronic deafness; and gave instructions for the removal of collections of filth, hardened wax, and foreign bodies, &c. He merits little imitation in his treatment of dulness of hearing, attended with cephalic pains, and of singing in the ears, &c. by shaving the head, persevering friction, washing with hot water, withholding strong diet, and allowing much exercise, &c.; though even more recent authors, as Itard (*d*), bow to the same maxims. But, unfortunately, the topical application of extremely acrid irritating remedies has obtained a very dangerous preponderance in the practice of Celsus; myrrh, vinegar, opium, veratrum, alum, frankincense, turpentine, castor, &c. are indiscriminately recommended

(*b*) De Morbis Vulgaribus, sect. vii. p. 278, edit. Foesii.

(*c*) Medicina, lib. vi. c. 7.

(*d*) Traité des Maladies de l'Oreille, i. p. 228-290.

for inflammations, pains in the ears, (meaning those unattended with inflammation,) otorrhœa, polypi, strictures of the meatus, dulness of hearing, tinnitus, &c. With such empiricism he never once attempts to make the business of cure satisfactory, or even easier to the practitioner; but, in the composition of Archigenes, puts him in possession of a remedy for every and any disease of the ear, the efficacy of which, as he says, is proved by experience, and which is compounded of castor, white pepper, ginger, myrobalanum, frankincense, Syrian myrrh, crocus, nitrum, and vinegar.

This pernicious practice of applying compounds of powerfully acting remedies to all diseases of the ear without any distinction, even to the contempt of subsequently acknowledged intrinsic differences between these diseases, obtained from the age of Celsus to our own times the most extensive sway; and, indeed, induced Galen (*e*) to banish the good practical rules which Celsus had given for the treatment of inflammatory affections of the ear.

Galen, it is true, distinguished (*f*) various causes giving origin to pains of the ear; such as cold, injections of medicated fluids into the meatus, inflammation of the contiguous integuments, acrid, viscid, sanious secretion from the meatus; and he condemns the treatment of pains in the ears according to the principles of Apollonius, who places simple fat, ox-gall, and garlic in the same category. But this indicates little more than a momentary consciousness how necessary it is to take into consideration the intrinsic difference between individual diseases of the ear; for, immediately after passing the above censure on Apollonius, he himself advises the treatment of pain and ulceration of the ear (without making any further distinction) with the most violent stimulating applications. For this purpose he gives an almost interminable series of compositions, from Heras, Apollonius, Asclepiades, Charixenos, Archigenes, and Andromachus (from the latter even twenty-four sorts), in

(*e*) Opera Omnia, edit. Kühn, tom. xii. (*f*) Opus cit. p. 599, et seq.

which galbanum, myrrh, turpentine, alum, opium, &c. are mixed together, and all applied together to maladies of the ear of every kind. Even the etiological distinctions established by himself disappear altogether in his treatment. Were the pains in the ear caused by cold? he allows garlic, onions, euphorbium, savine boiled in oil, and very finely powdered pepper to be introduced into the ear: were they the result of inflammation of the surrounding integuments? then nard ointment, opium, castor, and frankincense were to be introduced into the ear; black and white hellebore, cinnamon, cassia, bryony, and arum, &c. he prescribed if the otalgia were produced by viscid, sanious secretions in the meatus.

Ulceration of the ear he cured with crocus petals, myrrh, chelidonium glaucinum, and iron filings boiled in vinegar, besides making use of the above-mentioned compositions.

Singing in the ears he explained sometimes as "spiritus flatuosi," sometimes as an "exquisita sensûs audiendi sensibilitas," and treats it accordingly, either with "medicamentis discussoriis et incidentibus," or with "stupefacientibus;" that is to say, always with the various topical, irritating, stimulating remedies already mentioned,—opium, castor, nitrum, alum, &c.

For dulness of hearing he recommends every sort of fomentation, drops consisting of white vinegar with nitrum, onion-juice, ox-gall, nut-oil, alum boiled in vinegar, myrrh, &c.; so that it must be confessed that in Galen's time acoustic medicine had retrograded considerably; for the directions distinctly given by Celsus for the individualisation of diseases of the ear, were evidently lost sight of.

For more than a thousand years, these crude empirical principles of Galen maintained undiminished and entire authority. The inestimable anatomical discoveries respecting the ear, that were made towards the end of the fifteenth and in the first half of the sixteenth century, by Achillini, Berengar, Vesalius, Ingrassius, Eustachius, Fallopius, Casserius, and others, had not the least influence on the patholo-

gical and therapeutical views of the practitioners of that period; so that in the treatise of Mercurialis (*f*), which for a time was of the greatest celebrity, there is nothing more to be found, with the exception of some theoretical embellishment, than what Galen had delivered fourteen hundred years previously. Deafness is in the same way said to arise from "frigidis et calidis obstruentibus;" singing in the ears from the "spiritus," or a "nimia sensûs audiendi sensibilitas;" and pains in the ears from a "causa calida," or "frigida." The same treatment is recommended for the most acute inflammatory affections; for some of these, indeed, bleeding, cupping, purgatives, &c.; but for by far the greater number of them, the topical application of onion-juice, hellebore, castor, and oil of mustard. He even repeats and recommends earnestly, and with entire conviction of its propriety, the barbarous old practice of holding a child up by the heels and shaking him, in case a foreign body had fallen into the ear; and in the event of the same accident occurring to a man, tying him on a plank with the ear in which the foreign body is sticking towards the board, and jolting it up and down.

Fabricius Hildanus (*g*) was the first to return again to the path of thorough investigation; but unfortunately he merely directed his attention to the external meatus and its morbid states, polypous formations, the presence of foreign bodies, irritation from acrid fluids, &c. He invented the first speculum auris, for the better investigation of the meatus, an instrument with which no aurist will ever be able to dispense.

Would that Bonet (*h*) had but done as much for our knowledge of diseases of the internal ear, as Hildanus endeavoured to do for those of the external. But Bonet has not only not subjoined to his dissections any explanatory histories of the cases, but has never once accurately exa-

(*f*) De Oculorum et Aurium Affectibus Prælectiones, 1591.
(*g*) Opera Omnia, 1646. (*h*) Sepulcretum, 1679.

mined the ear; so that these must be considered as examples of how such dissections ought not to be made, if they are to prove of any service to science.

Du Verney (*i*) published a work, a few years after Bonet, the anatomical portion of which is rich in excellent luminous illustrations and investigations, the well-merited reputation of which has also been extended to the pathologico-therapeutical treatise appended to it; but certainly most unjustly. For, although in this treatise Du Verney goes a step farther than his predecessors, by considering, not merely the diseases of the meatus and of the membrana tympani, but also those of the cavity of the tympanum and of the labyrinth; yet he very much lowers the expectations excited by his work, by declaring (*j*) that he does not mean to investigate the diseases of the ear *thoroughly*, but merely with reference to the structure of the organ, in order to show how important is the knowledge of the anatomical structure of the parts to the elucidation of their morbid states. But even this object he by no means attains; as, for example, when speaking of diseases of the meatus, he represents otalgia as an independent disease, without investigating what organic alterations of the meatus may occasion or maintain it. Instead of this, he, in a very superficial way, derives otalgia from acrid ear-wax, and from acrid and saline serum secreted from the glands of the meatus; he allows that it is almost always accompanied with acute fever, loss of sleep, delirium, convulsions, and syncope; but directly after, he is compelled to confess that the same otalgia, in spite of its acuteness, may arise without any inflammation or any swelling (*k*). He is also equally in error when he ascribes the mortally dangerous "otitis interna," as well as "otitis externa" to ear-wax, acrid serum, &c.; and when he makes the etiological indication the foundation of his treatment in otalgia arising from cold, enjoining along with

(*i*) Traité de l'Organe de l'Ouïe, contenant la structure, l'usage, &c. 1683.

(*j*) Idem, p. 110. (*k*) Idem, p. 124.

bleeding, warm external applications, hot fomentations, infusions of balm and marjorum as injections (*l*), and oil of anise seed, and of cloves, as drops to be introduced into the diseased ear.

His admission of an otalgia, produced by cold and by excitement, might be passed over; but then he ought not to have left us ignorant of the distinctive characters of the two forms, nor to have treated the two in the same way, with bleeding, purgatives, mild and stimulating remedies, and the external application of narcotics.

His pathological views seem altogether confused, when he separates otalgia attended with inflammatory fever, from inflammation of the meatus with abscess and ulceration; for the two form one and the same disease, only in different stages of development. Nothing but the neglect of ocular inspection could have led him into these and other similar erroneous views; as when he still farther represents relaxation and too great tension of the membrana tympani (which in the patient no mortal eye has ever discovered) as diseases of this membrane, and considers it possible that it may be ruptured by violent expirations with the mouth and nose closed, although his own feelings revolt against so purely theoretical a notion, for he declares such rupture of the membrana tympani to be almost inconceivable (*m*).

It is true, he is the first who declares, that tinnitus is not a peculiar independent form of disease, but merely a symptom of an affection of the brain, or of the most varied diseases of the ear; but not the least farther does his mania for theoretical subtleties allow him to advance in the knowledge of the opposite conditions to which this state has reference. Still less, however, does he give us, either here or elsewhere, any good therapeutical principles, though bleeding in inflammatory diseases of the ear must be allowed to be an exception, but even this is always very vaguely recommended.

(*l*) Op. cit. p. 135. (*m*) Loc. cit. p. 179.

It would evidently lead me too far, were I to go through each of his particular plans of treatment for acrid serous secretions in the meatus, strictures of this canal from tumefaction of the glandular integument, relaxation and too great tension of the membrana tympani, &c. In these he is principally guided by theoretical speculations, and by the old established partiality for specific compounds (*m*). He even advises caries of the tympanum to be treated with the most violent topical remedies, with camphor, euphorbium, myrrh, and aloes; whilst any collection of impurities within the cavity of the tympanum appears to him to be incurable.

In Du Verney the anatomist is always to be admired, but never the physician: a criticism which must be applied, in its full extent, to Vieussens, Valsalva, and Cassebohm. To Valsalva (*n*), for example, we are merely indebted for a section of his work, not altogether uninteresting, relative to dulness of hearing in those whose membrana tympani and ossicula auditûs were found destroyed, or otherwise altered; but by which the nature and treatment of diseases of the ear has been no more essentially advanced, than by other isolated pathological observations of Wepfer, Willis, Riedlin, Hoffman, and others.

The most important advance, or rather an impulse the most fruitful in its consequences to subsequent important advances, was effected by Guyot, a postmaster of Versailles, who, by a lucky thought, was induced to inject his Eustachian tube (the anatomical discovery of which, by Eustachius, had, for nearly two hundred years, been made no use of) with a view to relieve his own deafness. A short communication on this subject was made to the Parisian Academy of Sciences, in the year 1724. Notwithstanding the great imperfection of Guyot's method; that is to say, notwithstanding the introduction of the instrument through the mouth, a plan now altogether abandoned, and replaced by

(*m*) Loc. cit pp. 171, 172.

(*n*) Tractatus de Aure Humanâ, 1717.

the more correct method of introducing it through the nasal fossa, Guyot's discovery still forms an epoch in the history of acoustic medicine; for it has afforded a fixed, and indeed a most sure basis, for understanding and treating diseases of the middle and internal ear.

The French physicians, however, were not sufficiently sensible of the discovery of their countryman, whose procedure was first rendered complete by Cleland (*o*), an Englishman; for he endeavoured to introduce a silver but flexible catheter through the nose. A series of years afterwards, the Montpellier physicians (*p*) were the first to change the flexible catheter, as inconvenient in its use, for an inflexible one, which certainly deserves the preference.

Wathen (*q*) first communicated histories of cases, in which he had obtained results at least partially favourable, by injections into the Eustachian tube. The diagnosis of the diseases of this canal was not, at that time, the question; but Wathen advised, that, when the treatment of the meatus, and of the tonsils, &c., afforded no relief, catheterism of the Eustachian tube should be tried; a proposition which is repeated even by Itard (*r*).

Leschevin (*s*) has performed this operation, only on the dead subject, and in his prize essay, has not in general advanced at all beyond the superficialness of his time, in this department of medical knowledge.

Büchner (*t*), Gniditsch (*u*), and Wildberg (*v*) may be passed

(*o*) Philos. Transact. vol. xli., part ii. p. 848. 1741.

(*p*) Sauvages Nosologie Méthodique, ii. p. 228. 1771.

(*q*) Philos. Trans. vol. xlix., part i. p. 213. 1755.

(*r*) Traité des Maladies de l'Oreille, &c. ii. p. 77.

(*s*) Prix de l'Académie de Chirurgie, tom. iv. p. 67, et sqq.

(*t*) Abhandlung von einer besondern u. leichten Art, Taube hörend zu machen, 1759.

(*u*) De Morbis Memb. Tympani, 1780, in Platneri Opusculis Academ. ed. Neumann, p. 608.

(*v*) Versuch einer auat. physiol-patholog. Abhandlung über die Gehörwerkzeuge des Menschen, 1795.

over without notice, as affording nothing of any importance to the present subject. To these must be added, and though with regret, yet without hesitation, Morgagni, whose brief sections on caries and suppuration of the ear are of no value, since the affected ear was not accurately examined by him, either during the life, or subsequent to the death of the patient. His observations on diseases of the membrana tympani are of equally little value.

With all these defects in the best literary productions of the time, the treatment of acute diseases of the ear was tolerably successful in ordinary practice; the more evident general therapeutical indications were adopted with success, patients were treated by antiphlogistic remedies, both general and topical (*w*). But, towards the close of the eighteenth, and at the beginning of the nineteenth century, the information of physicians did not extend beyond acute diseases; of which Lentin's (*x*) unsuccessful attempt to advance to the knowledge of chronic diseases of the ear, affords the best proof. Lentin became completely lost in his speculations on the morbid alterations of the liquor Cotunnii, and their treatment; he went so far in his anxiety about the treatment of diseases of the external meatus and Eustachian tube, that his proposals are completely devoid of all practical utility, and the influence which, as an aurist, he has exerted on his contemporaries, and even exerts in the present day, has become absolutely prejudicial.

In the complete absence of any well founded diagnosis of diseases of the ear, the strangest propositions obtained admission. Towards the end of the eighteenth, and at the commencement of the nineteenth century, perforation of the membrana tympani, electricity, and galvanism, as general remedies for deafness, were seized with an enthusiasm which it is only to be regretted did not receive a better direction. But

(*w*) Burserii Institutiones Medicinæ Practicæ, 1785. iii. 285.

(*x*) Tentamen Vitiis Auditûs Medendi, in beyträge z. ausübenden Arzneiwissenschaft, 1793, ii. p. 79.

neither Cooper (*y*), nor Himly (*z*), Itard (*a*), Deleau (*b*), and others, who most especially recommended perforation of the membrana tympani, have given good proof that this operation really merits the eulogiums that were so freely lavished on it. Not one of them has accurately investigated the Eustachian tube previous to the operation, though on this point they are all unanimous, that incurable diseases of the Eustachian tube afford the most important and frequent indication for the operation. Deleau even gives a case where, contrary to expectation, after perforation of the membrana tympani, the corresponding Eustachian tube was found to be perfectly healthy (*c*).

The natural result of a proceeding so uncertain, and of hopes so extravagant, was the discredit into which the operation very quickly fell, and indeed most justly; so that if it be still recommended and practised, here and there, as a general remedy for deafness, the fault of recommendations and practice so ill founded, can be attributed only to the operator's ignorance of the present state of science.

Still worse was the result of the methods yet more enthusiastically recommended, of treating diseases of the ear by electricity, galvanism, and mineral magnetism. Cavallo(*d*), Le Bouviers-Desmortiers (*e*), Grappengiesser (*f*), Sprenger (*g*), Augustin (*h*), Becker (*i*), and others, inspire so

(*y*) Philos. Trans., 1800, 1801, p. 151, p. 435.

(*z*) Commentatt. Gottingens, vol. xvi, p. 107.

(*a*) Traité, &c. ii., p. 204.

(*b*) Mem. sur la Perforation de la Membrane du Tympan, 1822.

(*c*) Idem, p. 117. (*d*) A Complete Treatise on Electricity, 1786.

(*e*) Mem. sur les Sourds-muets de Naissance, &c., 1803.

(*f*) Versuche den Galvanismus zur Heilung einiger Krankheiten anzuwenden, 2te Aufl. 1802.

(*g*) Anwendungsart der Galvani-voltaïschen Metallelektrizität, &c. 1802.

(*h*) Versuch einer volständ. systemat. Geschichte der galvanischen Elektrizität, &c., 1803.

(*i*) Der mineralische Magnetismus u. seine Anwendung in der Heilkunst, 1829.

little confidence by their communications as to the beneficial action of these powerful natural agents on the ear, that after the candid declarations of unprejudiced observers like Escke sen. (*j*), Schubert (*k*), Castberg (*l*), Pfaff (*m*), Pfingsten, and others, the utmost scepticism must be excited in the reader's mind respecting the vaunted wondrous cures.

Fabre d'Olivet (*n*) treats his method of curing deafness (probably electrical) as a secret remedy, and boasts of having cured three deaf-dumb patients in a few days. But as he has not fulfilled his promise of making known his method, and rendering it capable of being scientifically verified, he falls into the same category of nostrum-mongers as J. Williams (*o*), Méne Maurice (*p*), and others, who directly barter their remedies for the public credulity, and who cannot be treated by any scientifically educated physician but with the utmost contempt.

After having noticed these excrescences of acoustic medicine; it is doubly painful to meet with but little less evident empiricism in the otherwise distinguished physicians of the last ten years, and to see how they repeat, without any criticism, the superficial observations and erroneous views of their predecessors, and how they lay hold of the so called remarkable cases, selected in the most isolated manner, and amuse themselves and their readers with the most improbable hypotheses, instead of observing with their own eyes what is capable of being seen, and investigating in general those morbid changes occurring in the ear, that are susceptible of being perceived by the senses.

Trampel's (*q*) name can scarcely be mentioned here; his

(*j*) Galvanische Versuche, 1803.
(*k*) Von der Anwendung des Galvanismus bei Taubgebornen, 1805.
(*l*) Nordisches Archiv. von Pfaff, iii. 3, p. 74
(*m*) Idem, ii., 751; sqq. iii. 1, p. 242; iv. 1, p. 56.
(*n*) Notions sur le Sens de l'Ouïe en général, &c., 1819.
(*o*) New Observations on the Diseases of the Eye and Ear, 1817.
(*p*) Behandlung der Gehörleiden. No date.
(*q*) Wie erhält man sein Gehör gut, &c. 2te Aufl. 1822.

work has become too unimportant and even worthless, since the extended criticism on it by Menke. Albrecht (*r*), in his popular essay, makes no pretension whatever to scientific worth; but it is extremely to be lamented that Jos. Frank (*s*), in other respects so distinguished, should, even in the year 1821, represent otalgia and tinnitus as independent forms of disease, and arrange inflammatory affections of the meatus not according to the different organic parts that are implicated, but according to their causes, by which the diagnosis and treatment are rendered alike vague and uncertain. He allows himself, on the authority of earlier authors, (for he has no experience at all of his own,) to be induced to admit the hypothetical relaxation, tension, and prolapse of the membrana tympani, diseases of the ossicula auditûs, of the fenestra rotunda et ovalis, dropsy of the cavity of the tympanum, and diseases of the liquor Cotunnii. His diagnosis is founded, for the most part, merely on the subjective sensations of the patient, instead of the sure objective symptoms resulting from local investigation. He appears not to have practised catheterism of the Eustachian tube at all, and therefore is incapable of establishing on a solid basis, a diagnosis and treatment for the diseases of the middle and internal ear, which are so frequent. Rauch of St. Petersburgh (*t*), with great zeal, endeavoured thoroughly to investigate the diseases of the external meatus, but to no purpose; for the probe which he made use of, even in investigating the morbid conditions of the membrana tympani, cannot, from its uncertainty, inspire any confidence. It is quite contrary to experience, that the periosteum and annular cartilage, and, along with these, the cutaneous structures of the meatus, are especially liable to acute, and the glandular integument rather to chronic inflammation; that chronic inflammation of the meatus sets in either, with an increase,

(*r*) Die Krankheiten des Gehörs. Hamburg, 3te Aufl. 1819.

(*s*) Praxeos Medicæ Universæ Præcepta, ii. vol. i., sect. 2 b., p. 877.

(*t*) Vermischte Abhandlungen aus d. gebiete d. Heilkunde, von einer gesellshaft. Petersburger Aertze i. Samlung, 1821.

or with a diminution, or complete suppression of the secretion of cerumen, and that the latter admits of being restored by the application of topical remedies to the meatus, and behind the ear, and thus affords hope of curing the accompanying dulness of hearing. He has been more fortunate in the treatment of polypi of the ear; though I cannot concede the same unreserved preference to the ligature over every other mechanical curative means.

In chronological order, the writings of Van Hooven (*u*) and of Beck (*v*), the popular treatise of Riedel (*w*), and the aphorisms of Vering (*x*), should be arranged here; but as these are written without any spirit of criticism, excepting what is derived too much from their own peculiar practice, they are of no use as regards any practical information. Vering dispatches very cursorily the investigation of the meatus and of the Eustachian tube, the latter, indeed, he has never even practised on the living subject, for he speaks of the curved catheter of Saissy as useful. In most diseases of the ear, he sees (in opposition to repeated experience) merely the secondary effects of general cachectic diseases; and chronic inflammatory affections of the auditory apparatus he believes may last for years, without being prejudicial to the hearing, &c. Here also must be inserted the words of one of the greatest physicians of Germany (*y*), "That he considers all diseases of the ear merely as different degrees of the same affection, but by no means as essentially different forms of disease, and hopes to cure them all by one and the same method," against which opinion, the indubitably essential difference between diseases of the external meatus and those of the membrane and cavity of the tym-

(*u*) Disquisitio anat.-path. de Organo Auditûs in Homine, 1822. Dissert. pathol. de Morbis Aurium Auditûsque, 1824.

(*v*) Die Krankheiten des Gehörorgans, 1827.

(*w*) Ueber die Krankheiten des Ohrs u. des Gehörs, 1832.

(*x*) Aphorismen über Gehörkrankheiten, 1834.

(*y*) Hufeland Journal, Band liii. "Meine Methode die Taubheit zu heilen."

panum, and of the labyrinth, presents the loudest and most forcible protest.

The view presented to us by the state of acoustic medicine in England, is almost more unfavourable than that which Germany has afforded us. The preparatory labours of Cleland and Wathen, exceedingly praiseworthy for the time at which they appeared, seem to be completely forgotten by their countrymen.

Wright boldly describes catheterism of the Eustachian tube as an operation which cannot be depended on, which is extremely disagreeable, and which may be replaced by masticatory and sternutatory medicines (*z*). He expressly determines (*a*) *not* to classify diseases of the ear, merely in order to conceal the utter confusion of his work ; he refers to a larger work for his views respecting nervous deafness, (though the one at present under consideration, consists of 295 pages, large 8vo.) probably because he has no views to communicate which could be rationally associated with the use of purgative pills as a principal remedy for nervous deafness. Wright is surpassed in the shallowness and worthlessness of his treatise, only by Stevenson (*b*) and Curtis, from the latter of whom, as the head of a large institution for the treatment of diseases of the ear, verily better performances might have been expected. Curtis treats every discharge from the ear, exclusively, and in a summary way, by means of astringents; obstruction of the Eustachian tube with emetics, and perforation of the membrana tympani; whilst, in spite of all the entreaties of Saissy, he has never once practised catheterism of the Eustachian tube on the living subject. He makes tinnitus the chief symptom of nervous deafness (*c*), which he treats with purgatives, especially calomel, as long as the strength of the patient holds out. In all doubtful cases his chief attention is

(*z*) On the Varieties of Deafness and Diseases of the Ear. Lond. 1829. p. 187. (*a*) Idem, p. 56, p. 198.

(*b*) Deafness, its Causes, &c.

(*c*) A Treatise on the Physiology and Diseases of the Ear. 1817.

directed merely to ascertain whether the liquor Cotunnii be partially or totally deficient!! (*d*) or, whether hardened wax exist in the meatus. He fancies that the membrana tympani may be altered in its form by loud sounds, and rendered concave externally, (a form which, it is well known, is peculiar to this membrane,) and that by blowing into the Eustachian tube, or by exhausting the meatus of the air contained in it by means of a tube accurately fitted to it, the concave membrana tympani may be drawn forward and again rendered convex. In the otitis of children he sticks opium into the affected ear, &c.; so that throughout all his writings, nothing but the most crude empiricism is to be met with; and yet among his compatriots, as well as abroad, Curtis generally possesses the reputation of being a distinguished aurist.

Not less, though not altogether so undeserved, is the approbation which has been bestowed on the works of Saunders and Buchanan. Of the two, Saunders is the inferior (*e*). He treats diseases of the meatus without any solid symptomatology, even without any other investigation of them than that by means of the probe. He admits in the most arbitrary manner three stages of these diseases, simple purulent discharge, purulent discharge complicated with polypi, &c., and purulent discharge with caries of the cavity of the tympanum. He nowhere describes either the mode of origin or the progress of these important forms of disease; he informs us, only very briefly, of his purely topical mode of treatment for the two first stages (so called), and omits all mention of the treatment of the third stage, excepting that in one place he speaks, quite incidentally, of injections, leeches, and setons, as useful remedies. In obstructions of the Eustachian tube, (which he very incorrectly assumes to arise most frequently from syphilitic sore throat, and *angina gangrenosa*,) he knows no other

(*d*) Cases Illustrative of the Treatment of Diseases of the Ear.
(*e*) The Anatomy of the Diseases of the Ear. 3rd ed. 1829.

diagnosis than the declaration of the patient that the air does not arrive at the membrana tympani on blowing the nose; and his only remedy is perforation of the membrana tympani. Nervous deafness he diagnosticates in an equally unsatisfactory and uncertain manner, according to the patient's capability of inflating the cavity of the tympanum, and the simultaneous existence of tinnitus; and he attributes the affection to effusion of lymph within the neurilema of the auditory nerve, which is to be got rid of by leeches, strong purgatives, and bark.

Buchanan (*f*) is the only English practitioner who understands and practises catheterism of the Eustachian tube, although, unfortunately, this is the only good thing in his works. As for the rest, they are devoid of scientific arrangement. His system abounds in errors and repetitions, as *e. g.* when he divides his sixth genus, inflammation of the meatus, into 1, without diminution of hearing; 2, with diminution of hearing; and 3, with diminution of hearing and suppuration. Altogether groundless is the great importance (*g*) which, in reference to the perfection of hearing, he attributes to the form of the auricle, and of the meatus, and to the secretion of wax. His expectations founded on the use of an ointment to compensate for the deficient secretion of wax, and on pyroligneous acid for the cure of all discharges from the ear, are most exaggerated and totally unconfirmed by experience. Of pyroligneous acid, he affirms, that it is the most powerful remedy that has been introduced into the practice of acoustic medicine for a century past.

His tables of the dimensions of the auditory canal in man and in animals, as well as of the auricle in a hundred individuals, and his comparative anatomical investigations on the ear in general, can the less compensate for the deficiency of

(*f*) An Engraved Representation of the Anatomy of the Human Ear, &c. 1823.

(*g*) Physiological Illustrations of the Organ of Hearing, &c. 1828.

practical utility in his writings, since these tables afford no results, but merely materials for future investigations in the same field; although in order to consider them even as preparatory labours on this subject, it would be indispensably necessary to define the phrases "good and bad hearing."

That profoundness, the deficiency of which I have been constrained, though with regret, to point out in the German and English aurists, at length presents itself to view in a most gratifying manner, in the otiatric writings of Itard and Deleau. I cannot associate Desmonceaux (*h*) with these, nor even Alard (*i*), though his work is denominated classic by Itard. For after having separated catarrh of the external ear from that of the internal, Alard describes as acute catarrh of the external ear, only the most mild affection of the glandular integument of the meatus, and in chronic catarrh of the external ear he makes no mention of polypi, of tumefaction and stricture of the meatus, nor of caries, on the existence of which the discharge from the ear depends. He is quite unaware that catarrh of the internal ear commences with accumulations of mucus in the cavity of the tympanum; he invariably directs all his attention merely to the morbid secretion, that is to say, to the symptom of the morbid alterations of the membranes of the meatus, of the membrana tympani, and of the cavity of the tympanum, totally neglecting the morbid changes themselves, which are of far more importance. The remedies with which he expects to cure the otorrhœa, are chiefly of a spirituous and aromatic character, and of which probably he has had as little experience as of the moxa, which, though he has never made use of it, he strongly recommends.

Of Montfalcon (*j*) it is enough to know that he is a slavish follower of Leschevin. Even Saissy (*k*), whose labours extend down to the present time, merits not, in the most

(*h*) Traité des Maladies des Yeux et des Oreilles, 1786, vol. ii.
(*i*) Essai sur le Catarrhe de l'Oreille, 1807.
(*j*) Diction. des Sciences Medicales, t. xxxviii. p. 24—35.
(*k*) Essai sur les Maladies de l'Oreille Interne, 1827.

remote manner, the consideration which his two German translators have sought to acquire for him. In his view, the spongy coating which usually covers the membrana tympani in newly born children, relaxation and morbid tension of the membrana tympani, paralysis of the internal malleolar muscle, and protrusion of the membrana tympani into the meatus, are real morbid states, of which, however, even he has met with no ocular proof. He neglects ocular inspection in inflammation of the membrana tympani; performs the perforation of this membrane in a manner that becomes blind chance; confounds catarrh of the middle ear with true inflammation of the ear, which passes into perforation of the membrana tympani and the escape of pus; and either leaves us altogether at fault with regard to the diagnosis of inflammation of the middle ear, dropsy of the cavity of the tympanum, obstruction of the latter and of the cells of the mastoid process, diseases of the ossicula auditûs, and of the muscles of these bones; or founds the diagnosis on a basis as frail, as indeed it always will be in such imaginary diseases. Even when speaking of accumulations of matter in the cavity of the tympanum and in the mastoid cells, he is so brief; so entirely omits all mention of precautionary rules for injecting the Eustachian tube; and of the two cases which he gives, represents only one as having been slightly benefited by the injections; that I am disposed, contrary to general opinion, to deny him, though not all, yet certainly any extensive experience on this subject; and the more so as his triply curved catheter is an instrument peculiarly and altogether incapable of practical application. But he most completely forfeits our confidence, by his advice to perforate the Eustachian tube, when obstructed or obliterated, by means of a trochar; and by the most unpardonable rashness with which he has actually undertaken to practise the operation.

In precisely the same confused manner, he goes into lengthened criticisms, in the sections on diseases of the labyrinth, of the fenestræ, and of the liquor Cotunnii, where

he is naturally devoid of any experience of his own, because no experience is here to be obtained; but Saissy nevertheless troubles himself about the diagnosis of these purely hypothetical diseases.

Though rising far above the worthless work of Saissy, Itard (*l*) is not free from great imperfections, which are particularly manifest in his mode of systematising the diseases of which he treats. Thus he separates organic diseases of the meatus from the functional derangements of the same part; and inflammation of the meatus and of the cavity of the tympanum, from the diseases consequent on it, from purulent and mucous discharges of the meatus, and of the cavity of the tympanum, from strictures, polypi, &c. of the meatus. Farther, he takes the distinction between pus and mucus, so difficult to be established, as his ground of arrangement of otitis and otorrhœa; he admits a purely nervous otalgia (in which, however, he was afraid of the introduction of opium into the meatus); perforation of the membrana tympani, independent of previous inflammation; and even the existence of tinnitus as an independent disease, which, a century previous, Du Verney had shown to be false.

But notwithstanding these and other defects, Itard has unquestionably the merit of having treated diseases of the ear more comprehensively, more methodically, and with more critical acumen, than had ever been done before. It is gratifying to observe how he treats the hobby-horse of all other authors, the relaxation and tension of the membrana tympani, the separation and anchylosis of the ossicula auditûs, and also paralysis and convulsions of the muscles of these bones, as the result of theoretical speculations, and strikes them out of the list of diseases of the ear. He had consequently but to continue in the same course, and treat in the same manner the hypothetical deficiency of the liquor Cotunnii, and the loss of the ossicula aûditus, which though really of not infrequent occurrence, is not to be

(*l*) Traité des Maladies de l'Oreille et de l'Audition, 1822, 2 vol.

viewed as a peculiar species of deafness; for perforation of the membrana tympani, and chronic inflammation of the middle ear, &c. are always associated with such loss, and it is never possible to estimate how large a share of the dulness of hearing is to be attributed to the loss of the ossicula auditûs.

But we are most of all indebted to Itard for the industry with which he has applied himself to the treatment of diseases of the middle ear, by means of aqueous injections; and from the great utility of his instruments, from his method of employing them, and from the practical cautions manifest in his proceedings, it is evident that he has really often made use of injections. Thus he describes very fully the method first adopted by him, and by which (though in a very circuitous manner) he cured catarrh of the middle ear even without injections. He does not even conceal the imperfections which attended his method of making the injections at first, that they gave rise to pain, vertigo, and other ill consequences, so that our confidence in him cannot but be thus still more confirmed.

After such preparatory efforts, the substitution of condensed air to be introduced into the cavity of the tympanum instead of water, and the use of this as a mechanically acting remedy for diseases of this cavity, was not so great and astonishing a step as Deleau would have us to believe. Nevertheless, this procedure has very great advantages over the water douchè, as will afterwards be fully explained. But unfortunately, Deleau's industry has only extended to the diagnosis and treatment of diseases of the middle ear, at least we have as yet no evidence of his having overstepped these limits. His skill does not extend to the labyrinth, the nerve of which can naturally derive no beneficial influence from a stream of condensed air; so that when this flows freely into the middle ear, Deleau declares the dulness of hearing to be of a nervous character and incurable.

Itard has not retreated so entirely discouraged from the field of nervous deafness. He very correctly defined its

diagnosis and mode of origin, and even made a remedial attempt perfectly adapted to the nature of the disease; but unfortunately, the little success which followed this attempt, too readily frightened him from the path on which he had entered.

Since this time, no author has again renewed the unsuccessful attempt; no one has endeavoured to remedy the deficiencies which must necessarily have prevented the desired success; so that the large class of patients labouring under nervous deafness still remained without any help. To remedy this deficiency has been my especial endeavour, and in the proper place I shall adduce satisfactory proof that my method, adapted to the various degrees of development of nervous deafness, is capable of affording undoubted assistance and alleviation.

It has also been my endeavour to arrange diseases of the ear in a more natural manner than has hitherto been done; to refer them to definite organic alterations of the constituent parts of the ear; to avoid all hypothetical and speculative assumptions; and to establish the diagnosis of each form of disease by *the exposition of objective symptoms, independent of the ever doubtful accounts of the patients, and on this sure basis to establish a plan of treatment as simple and certain as possible.*

§ 2. *Importance of the organ of hearing.*—It appeared to me that the organ of hearing was worthy of every effort for the preservation of the function which nature has allotted to it; for lesion of this function, besides its serious consequences to the mental education, readily exerts the most pernicious influence on the disposition of man. It is not the deprivation of musical enjoyment that lies so heavy on the heart of the deaf person: no! the melody of the heart which speaks to man in the soft tones of overflowing affection, is silent to him who merely hears a harsh, elevated voice, and scarcely this: the magic of social converse, the delight of men of every age, the interchange of thought at a convenient bodily distance, is lost to him. The interior

of his mind becomes altogether unnoticed, but hardly ever fails to be betrayed by a melancholy, mistrustful tone of voice, the narrower and narrower the circle becomes, within which perceptible tones still reach his ear. The younger the patient, the heavier does the deafness weigh, even on the development of all the relations of life, though for a long time the light-heartedness of youth wards off the gloomy influence with which the disease threatens to sway his mind.

But the most deserving of commiseration are those children whose hearing, from defective organic conformation, either congenital, or arising during the first five or seven years of life, is totally destroyed, or so far debilitated that speech is either not acquired at all, or that partial degree which may already have been acquired, completely escapes from the memory, and dumbness, even in this case, is the result of the disease of the ear. Here, apparent intellectual death occurs, the terrors of which beneficent nature has kept at a distance from those born blind, and made hearing in its importance to the intellectual man far above all the charms of sight.

It is surprising, notwithstanding the compassion which the blind receive in full measure from all those by whom they are surrounded, that this should so seldom be the lot of the deaf. The mystery is solved only by the unimpaired corporeal development of the deaf; their free, unrestrained movement; and the concealed situation of the auditory affection, which in no way strikes our senses, but which yet renders difficult (or rather makes impossible) every communicative act, in consequence of the frequently insupportable effort to the speaker; while on the other hand, circumstances presented to the mind of the blind obtain immediate reception.

§ 3. *Anatomy of the Ear.*—The anatomy of this most important organ has attained to an almost unexampled state of perfection, by the admirable perseverance and acuteness of the most distinguished anatomists. After the labours of

Scarpa, Scœmmerring, and others, it may be considered as complete. It would, therefore, be quite improper, after the example of Itard, Saunders, Buchanan, and others, to append to the present pathologico-therapeutical work, an anatomical description of the ear. It was not in the power of these individuals to add anything of importance to the complete anatomical descriptions, which are already in the hands of every well-educated practitioner, or to render in the least intelligible to the non-medical reader the very complicated structure of the ear.

§ 4. *Physiology.*—Vain have been the efforts to discover and establish the physiological importance of the particular constituent parts of the ear. Even comparative anatomy has hitherto afforded no assistance in this respect, and probably never will. It is not in our power to determine the normal acuteness of hearing, possessed by the ear either of man or of particular animals, whence it naturally follows, that not only must we remain ignorant of the difference between the hearing of man and that of animals, but that also the difference of structure between the ear of man and that of animals cannot be referred to a greater or less acuteness of the hearing of the respective ears; nor on the other hand can the supposed greater acuteness of the hearing of particular animals be referred to the difference observed in the structure of their ears. It is certainly erroneous to consider, with Itard (*m*), the external ear as of no use at all to hearing, and to affirm that this function is not at all impaired by the loss of the auricle. Such an opinion is merely the result of not accurately determining the power of hearing before and after the loss of the auricle.

Equally exaggerated is the opposite view which Buchanan (*n*) takes of the subject, as to the influence which he supposes the size of the auricle, its configuration, and the angle

(*m*) Traité, &c. i. p. 131.

(*n*) Physiological Illustrations, &c. p. 77.

at which it is attached to the side of the temple, must exert on the function of the ear. His practical proofs, viz. that he has cured existing deafness, simply by an artificial alteration of the direction of the auricle, betray too little of the spirit of careful, circumspect observation to allow us to place much confidence in them. It is very probable that certain medium conditions of size, of the configuration of the prominences and depressions of the auricle and of the angle at which it is attached to the temporal bone, may most advantageously assist the hearing, so far as this depends on the parts of the organ destined to catch sounds; but I have learned from very numerous observations, that even important deviations from these normal conditions are not followed by any serious disturbance of the function of hearing.

I must adopt the medium between the eccentric opinions of Itard and Buchanan, and may take this opportunity of declaring my conviction that the ear, like every other organ, can only be really in its highest state of perfection when all its constituent parts are found to be in their most complete, harmonious perfection. Certainly the auditory nerve is of more importance to hearing than the auricle, but the structure of both must be perfect, if the hearing is to possess the greatest possible degree of nicety and acuteness.

There is, however, no greater fault in the education of children than that of allowing the auricle to become flatter and more fixed than is natural to it, by the habit which they have of pulling down the night-caps which they wear in early life. The voluntary motion of the muscles of the auricle is thus lost from want of use. The acute hearing, met with among savage nations, certainly depends on circumstances far different from such purely mechanical ones as these.

§ 5. *Prophylaxis.*—Far more important than the question respecting the uses of particular parts of the ear, is the care to preserve its healthy condition, in so far as dietetic rules, in the most extended application of the term, can accomplish this. So long as the hearing is still not in the least debili-

tated, or so long at least as such a state of hearing is supposed to exist, it is, unfortunately, difficult to enforce the adoption of precautionary rules for its preservation in a condition so inestimable.

If even a reasonable attention to the preservation of sound hearing cannot be considered as excessive anxiety, still less can it be so considered, when a morbid condition of the ear (of any kind whatever) already exists, or when, after the removal of this, an evident disposition to relapse remains. The greatest attention to two important injurious influences, *cold*, and *acute sounds*, cannot be recommended with sufficient urgency.

The application of *cold* in every form, acts injuriously on the ear; not only on the auditory nerve, but even on the membranous constituent parts of the organ, whose small supply of blood and of vital heat is quite unequal to resist the power of cold. It is, therefore, a most pernicious prejudice, to think of invigorating the ear by washing it with cold water; it should be most carefully avoided. The ear should only be cleansed with tepid water, it should be guarded when bathing in fresh or salt water, or during cold affusions, not merely with cotton wool, but also by an oiled silk cap, and plunging overhead should be abstained from. Damp, cold, stormy weather is equally injurious, and from this the ear should be protected in precisely the same way.

The second object of our attention should be *acute sounds;* the ringing tones of trumpets, bassoons, horns, and other instruments of brass, the violence of which is apt to over-excite an irritable debilitated auditory nerve. Most generally the buzzing in the ears is thus rendered more acute and louder, and the dulness of hearing augmented. A practical proof of this is afforded by the fact, that those ear-trumpets for the construction of which metal is employed, over-excite the auditory nerve by the loud shrill sounds which they transmit to it, and are therefore altogether objectionable, as will be more fully shown in the section on ear-trumpets.

§ 6. *Symptomatology.*—There is *but one single symptom* which is peculiar to all diseases of the ear without exception; either an increased, or in various degrees diminished activity of the auditory nerve. Whether these diseases have their seat originally and exclusively in the ear, or whether the latter suffer sympathetically from the affection of some other organ; whether a portion or the whole of the organ be labouring under an acute or a chronic affection,—there will never fail to be an alteration of the faculty of hearing, and this will in each case bear a definite relation to the intensity and extent of the organic morbid condition. Irrespective of the undoubted dependence, theoretically considered, of function on the state of its organic foundation, daily experience invariably affords irrefutable proofs of the opinion here entertained on this subject; so that I may affirm it to be quite contrary to experience, that even chronic inflammatory affections of the auditory apparatus, often lasting the whole life, may exist without injury to the faculty of hearing (*o*). Such an error is the inevitable result of the negligence with which the mode of testing the hearing is conducted. In general, the hearing is considered still perfectly good, so long as the individual in question can conveniently discharge his social relations, and take his share in conversation without difficulty. The human voice is thus made the standard of comparison, the validity of which could only be admitted if either every person, or at least any particular individual, not only always spoke in the same tone, but also, always with the same force of tone, and accurately in the same direction towards the ear of the patient; and thus under conditions which plainly do not admit of being fulfilled. Patients who hear very badly with one ear, often think that they still hear perfectly well with the other, and therefore consider any further proof of this quite superfluous. It would, however, be greatly to their prejudice to neglect such an investigation; as the *mere contrast between the more and the less affected ear makes the*

(*o*) Vering, Aphorismen, &c. p. 13.

latter, which may be already diseased and equally in need of being treated, appear perfectly sound. This error is easily rendered manifest by a definite standard, *e. g.* the sound of a watch. The human voice, therefore, as well as the capability of hearing the human voice more or less distinctly at a greater or less distance, is no certain standard whatever for the alterations in the power of hearing in general, much as this were to be desired; since good hearing is principally of importance to us for the sake of the human voice. The ear has evidently not the same susceptibility for all sounds, though of the same force, so that we cannot with absolute certainty conclude, from an increased susceptibility for a definite sound, *e. g.* that of a watch, that a precisely proportionate increase of capability of hearing the human voice exists. Still, however, there is always a very close indisputable relation between the two, and more close than that afforded by any other standard; for the works of a watch always give a *uniform sound*, the *distance* of which from the ear to be investigated always admits of being *accurately defined*, and which may always be presented to the ear in the *same direction*. It is easy also to preserve such a state of quiet in the neighbourhood of the patient, that even in repeated trials no disturbing differences may arise from this cause.

Watches have, indeed, for a long time, frequently been made use of for this purpose; but, from the difference of strength between the works of different watches, an indispensable preliminary was neglected; viz. to define *at what distance a sound ear could hear the watch selected as a standard of comparison.* It is only when this normal distance has been determined by frequent trials with a sound ear, that we are in possession of a standard of the utmost possible certainty for the present object; and it is only then, that the observations of different practitioners can be collected and compared with each other, when they state the normal distance at which the watches are heard that they make use of for their observations. Of course, in order to estimate a

very advanced degree of dulness of hearing, a watch must be selected that can be heard at a very considerable distance by a sound ear. My watch can be heard by any sound ear, in an uninterrupted series of ticks, even at a distance of thirty feet, in the midst of the utmost possible stillness, during the day-time. Night alone affords us absolute stillness, but many inconveniences render it impossible to make use of this zero in the scale of noise.

The trial of the hearing distance, when repeated on the same patient, must always be repeated in the same circumstances, internal as well as external; always in the same room, and during the same degree of surrounding stillness, as well as of the mental and bodily repose of the patient, on whom the trial is made; either always before or after a syringing, or sitting before the vapour or air apparatus; and with the watch in the same direction towards the ear, &c.

Wolke (*p*) was the first who invented an acoumetre of a different kind, the mechanism of which consists in a metal hammer falling at a determinate angle on a metal plate underneath. Itard (*q*) seems either to have been acquainted with this instrument, or to have been led by chance to hit on the same idea in the construction of his acoumetre; certain is it that the instrument of the French physician differs from that of the German professor only in its greater elegance. The chief objection to this complicated instrument, which is not always to be found at hand, is, that it is impossible to estimate by means of it, the slighter alterations of the faculty of hearing, which, *e. g.* during the course of any medical treatment that has been adopted, is of the greatest interest, and can readily be accomplished with a watch, even to the distance of half an inch.

§ 7. *Progress.*—Diseases of the ear are disposed to run a chronic course, unattended by fever. Even the original, inflammatory, febrile character of many of these diseases is

(*p*) Gilbert's Annalen, 1802. ix. Band, 3 Stück.
(*q*) Traité, &c. ii. planche i., fig. 1.

but very rarely truly acute, and is even then very much disposed to become chronic, to relapse, and to pass into secondary affections.

On an average, not more than two out of a hundred patients labouring under diseases of the ear will be found, whose disease assumes a really acute character. The rest all labour under forms of disease, which have from the first been of a chronic character, or such as are attended originally by a slight inflammatory excitement, which, however, soon merges into a morbid secretion from the affected parts, and assumes a purely chronic form. The reason of this peculiarity depends on the solid structure of the ear, composed of bone, cartilage, and membranes firmly stretched over these, and which is but sparingly supplied with cellular tissue, and with an equally small proportion of blood-vessels.

§ 8. *Frequency.*—Diseases of the ear are extremely frequent, much more frequent than is generally believed. This arises partly because many, from the fear of being troublesome to those about them, in consequence of their difficulty of hearing, endeavour to compensate for this by increased attention, and are even enabled to compensate in this way for what their hearing has lost in acuteness; partly because we often doubt the existence of difficulty of hearing, from the supposition that the person in question merely displays absence of mind; and partly because diseases of the ear do not so immediately meet our eye as blindness, and short and long sightedness, which are both equally apparent from the spectacles on the nose; to make no mention of the many other very striking diseases of the eye.

§ 9. *Predisposition.*—Many persons are undoubtedly predisposed hereditarily to diseases of the ear. In some families, several, or even all the members suffer from difficulty of hearing in a greater or less degree, especially of a nervous character; even deaf-dumbness often occurs several times in one and the same family, though as yet we have no example of deaf-dumb parents (of whom there are but few) having had deaf-dumb children.

Advanced age strongly predisposes to dulness of hearing. But undoubtedly the most important predisposing cause is to be found in the open structure of the ear, which exposes it to all the injuries of the weather, and renders it readily accessible to all acute impressions on its sense, against which it is not protected by any contrivance like that which the eye possesses in the eyelids. To the ear, in general, that constant attention is not paid, which in full measure falls to the lot of the eye.

§ 10. *Exciting Causes.*—Among the causes which give origin to these diseases (but which in many cases, notwithstanding all our research, remain hidden in the deepest obscurity), cold stands pre-eminent; though patients who are quite ignorant of any sufficient cause to which to attribute the origin of their disease, frequently betake themselves to this common ground, in order to pacify both themselves and their physician. The lining of the external and middle ear, with a glandular secreting membrane, offers convenient ground and soil for catarrhal rheumatic affections; and besides the independent diseases to which it is subject, frequently participates in the diseases of the adjacent mucous membranes. Cutaneous diseases, both acute and chronic, together with the constitutional cachexy on which they depend, especially scrofula, are often in a remarkably evident way connected with the production of diseases of the ear. Erysipelas of the face, scarlatina, variola, varicella, measles, crusta lactea, tinea capitis, &c. often manifest the influence they exert in producing organic changes of the external and middle ear.

I cannot, conformably to experience, accord to other forms of disease any more intimate connection with the production of diseases of the ear. There are no observations extant, the careful accuracy of which warranted the supposition that any distant organ, *e. g.* the liver or uterus, could act sympathetically on the ear. The statements on this subject are only maintained in a very general way (*r*); *e. g.* that cephalalgia

(*r*) Tiedemann, Zeitschrift für die Physiologie, i. p. 272 et sqq.

and tinnitus in the right ear accompany diseases of the liver; tinnitus in the left ear, diseases of the spleen; and periodical deafness, colic, intermittent fever, intestinal worms, pregnancy, pain from calculi, &c. But as all these diseases of the ear have not been very specifically defined, the diseased ear not accurately investigated, (nor even has it been stated what was the mode of origin, and what the termination of these sympathetic diseases of the ear,) we are the less entitled to consider them as such, since Bremser (*s*), speaking of the sympathetic irritation from worms in the intestinal canal, declares that all the cases relating to this subject, prove absolutely nothing as to the injurious influence of the worms. For the disproportion of the influence of the diseased intestinal canal, over that of other organs, may with equal propriety be considered the cause of the phenomena (often altogether anomalous), as the irritation from worms. I must here, however, remark, that Bremser, in spite of his extended literary researches on this point, has not a single case that he is able to communicate, of sympathetic irritation of the ear from worms; whilst even histories of cases relative to this subject, can be of value, and be considered as affording distinct conclusions, only when the ear itself has been accurately investigated previously to the appearance of the disease from worms, and during the existence of the sympathetic irritation of the ear. Should any one, however, choose here to adduce those cases, in which convulsions resulting from difficult dentition are said to have given rise to deaf-dumbness; let it not be forgotten, that, in all these cases, it cannot be proved whether the child in question was not already deaf, when difficult dentition excited the convulsions, nor, whether simultaneous or subsequent injurious influences did not occasion the deafness.

Much more frequently, distant organs, the brain, the teeth, the neck, the breasts, the stomach, the bladder, and the uterus, suffer sympathetically from violent irritation of the

(*s*) Lebende Würmer im lebenden Menschen, p. 128.

auditory nerve; thus acute harsh tones have been frequently observed to set the teeth on edge, and to occasion a troublesome cough, vomiting, involuntary flow of urine, and hæmorrhage from the uterus; tickling and scratching the meatus excite in the larynx a troublesome irritation to cough; debility of the auditory nerve is associated with debility of sight, and loss of smell, even confined to one side alone, that of the diseased ear.

It cannot possibly be attributed to sympathetic influences, when inflammation or suppuration of the brain, gradually extending to the temporal bone, gives rise to inflammation and suppuration of the ear.

Nervous fevers very frequently produce a most marked debility of hearing. Deafness, which is associated with nervous fevers, has been frequently observed from the earliest times, and has been admitted according to circumstances, to afford either a favourable or unfavourable prognosis for the termination of the fever. But whatever may be the prognostic importance of this deafness, it is always of short duration after the patient recovers.

Depressing mental affections, grief, care, melancholy, violent terror, &c., act much more permanently and in a far more decidedly injurious mode on the vital power of the auditory nerve: they give rise to the most obstinate cases of nervous deafness.

Whether gout and lues act in any specific mode in producing diseases of the ear is still very doubtful; for those observers (*t*) who are disposed to decide this point in the affirmative, have made no careful investigation of the affected organ, and therefore they must be denied any decisive voice on the subject. I have never met with any confirmative observations, either in my own practice or in that of others.

§ 11. *Prognosis.*—In general the *prognosis* in diseases of the ear is by no means bad. It is true they have their seat

(*t*) Vering, Aphorismen, &c., pp. 16, 22, 34, &c. Jos. Frank, Praxeos Med. Univ. Præc., &c., pars ii, v. i, sec. 2 b, p. 897.

in an organ, the dense arid structure of which, from a natural scanty supply of fluids, and very unimportant connexion with the nervous system of the rest of the organisation, does not allow us to anticipate the removal of its morbid states by any peculiar *effort of nature*, by critical discharges, or by acting powerfully on distant organs, and thus by prolonged sympathetic reflex action on the ear. It is true that there is as little reason for expecting that the development of the system at puberty will produce any beneficial action favourable to diseases of the ear previously existing, and that have been left to themselves; yet it is of the utmost importance to know, that diseases of the ear admit of a *very certain diagnosis*, (not indeed according to the usual old established mode,) that in general they run a very chronic course, and that under the influence of these two circumstances, *they are almost all curable*, if the treatment *of them be only undertaken in proper time, and with the proper remedies*. But this right moment of time is, to the great prejudice of the patients, (partly from their own faults, and partly from that of ill-informed practitioners,) almost always neglected, and thus the disease is, artificially and quite contrary to its nature, rendered incurable.

Both patients and medical men far too readily hope, that an apparently unimportant affection, not attended by much pain, will disappear without any assistance from art. Many imagine that an otorrhœa which may exist, may be salutary as a channel of discharge for all sorts of acrimonies concealed within the interior of the body, and that therefore it ought not to be cured. Others again do not notice the diminution of their hearing until the disease has attained to a very high degree. Others are soon enough aware that they are suffering from disease of the ear, but knowing the bad success attendant on many curative methods pursued in the usual superficial way, shrink from any medical treatment. It is only to be wished that such patients may be fortunate enough to escape the evil tendency of their disease to become more and more confirmed from year to year.

In those patients who have already been subjected to various, severe, and opposite methods of treatment, by which the organic, as well as functional, morbid condition of the ear is so altered as to oppose the greatest difficulties to any future more rational mode of treatment, the prognosis is the worst. But especially dangerous is the almost universal utter ignorance of both physicians and surgeons with the manual, or, in other words, most important part of acoustic medicine, so that it approaches to a wonder, if even occasionally patients are actually cured by them.

The degree of the dulness of hearing, the age of the patient, and even the length of time that the disease has existed, of themselves afford absolutely no prognostic data. But the *degree of organic change* and of *functional disturbance* to which the disease has attained, are indeed of the greatest importance. *Ocular inspection, investigation by means of the catheter, &c.,* must always decide in particular cases on the organic state, and the acoumetre on the functional. Every other circumstance, even hereditary predisposition, is of far less importance than those just mentioned.

Acute forms of disease, in consequence of the haste with which patients seek for assistance, and the striking general indications which they afford the practitioner, whether he be acquainted or not with the particular treatment of diseases of the ear, are more favourable to the prognosis; but from the difficulty of arresting them, they are, on the other hand, more dangerous, not merely to the existence of the organ, but even to that of the individual, which can scarcely ever be said of chronic diseases of the ear.

Diseases of the external ear are easier of cure than those which are situated in the internal ear. This explains why diseases of the ear in children, whose external ear is most frequently affected, afford more decided hope of their being cured, than diseases in adults or in very old people, in whom the middle and internal ear is more apt to be affected. An absolutely incurable debility of the auditory nerve is associated with advanced age, though not necessarily

always, whence, however, it is not to be inferred that curable diseases of the ear do not also occur in advanced life.

Organic diseases of the ear are in general both cured and prevented from recurring after being successfully cured, with more certainty than functional diseases of the same organ, the causes of which are more difficult of recognition, and their progressive influence, and their renewal, much less under our control than is the case with organic diseases.

Organic diseases, when of long continuance, from the limitation of its activity thereby imposed on the auditory nerve, very readily induce a debility of the nerve, which, after the removal of the abnormal organic condition, often claims our especial care and attention.

The prognostic data which I have thus laid down, are throughout so much opposed to the conviction, almost universally entertained, of the incurability of most diseases of the ear, that I must endeavour to render the superiority of my own practice over that of the ordinary methods hitherto adopted, more clear by having recourse to figures. Such a review will, it is to be hoped, overcome the reluctance which many practitioners have to undertake the treatment of diseases of hearing, and will induce them to adopt in good time, and with appropriate remedies, a suitable method of treatment.

My opinion regarding the curability of diseases of the ear in general, (their individual curability will be considered in another place,) is founded on the results of 300 cases, as they have been recorded in my journal according to the order of time in which they occurred, without any selection, and after having been investigated in the most careful and complete manner. Certainly, such a number is amply sufficient to afford a close approximation to a correct statistical statement of diseases of the ear.

Of these 300 patients, 104 were found to be quite incurable, incapable of being at all relieved, and with the treatment of which, therefore, I took no trouble; the pro-

portion of these, therefore, is one to three. On the other hand, 188 were either completely cured or relieved by the treatment, whilst only eight of those who were actually put under treatment, were obliged to be left unrelieved, in spite of all the pains and care bestowed.

Of the incurable patients, and of those who derived but little benefit, the greater number, certainly, would have had a more fortunate, or even an altogether happy lot, had they only submitted themselves in time, that is to say, often *many years sooner*, to proper treatment, or even if they had not been subjected to treatment so improper as that which had already been employed.

§ 12. *Treatment.*—The treatment of diseases of the ear is indeed everywhere empirical; though for this, in the present case, there is no excuse whatever; for by means of a very accurate diagnosis, a perfectly rational mode of treatment is at our command, if pains be taken to search for appropriate formulæ. The importance of the subject renders it absolutely necessary to give, in the words of one of our most celebrated physicians of Germany, a view of this empirical treatment of diseases of the ear. Hufeland thus expresses himself(*u*); "I shall very briefly state my method, without allowing myself to enter into theoretical deductions and nosological subtleties, which, according to my experience, are seldom of much use in practice. Undoubtedly, it is with hearing as with sight, there are various forms of suffering; but they must rather be considered as different degrees of disturbance; first tingling and buzzing in the ears, and unusual noises, and so dulness of hearing, and eventually complete deafness. Thus, the seat of deafness may vary, according to the different parts of the organ, as blindness may; it may be either in the external intervening parts, in the integuments and the canals, or in the internal perceptive parts, in the nerve itself. But here the diagnosis is

(*u*) Neue Answahl kleiner medicinischer Schriften. i. Bd. p. 188—198. 1834.

extremely obscure, and in my opinion, even little adjutory to the cure, which depends far more on the distinction between the different characters of the affection; and as far as I have found, in this class of diseases, the catarrhal-rheumatic, or the serous is the most frequent character."

The author accordingly recommends topical cleansing of the auditory canal; promoting and increasing the action of the skin; derivation from the intestinal canal; and exciting absorption and nervous action in the ear itself. The means for effecting these very comprehensive indications, are the application of six or eight cupping glasses (rather than leeches) to the nape of the neck; and the following prescription: R. resinæ guaiaci ʒss., calomel., sulphur. aurati antimonii aa. gr. ij., elæosacch. fæniculi ℈j., M. This is to be made use of either *until some improvement ensues, or till non-success shows that nothing is to be accomplished by these means.* Farther, tartar emetic ointment is to be rubbed in over the mastoid process; sternutatories to be employed, composed of herba marjoranæ, flor. lavand., sacchari albissimi aa. ʒj. flor. convallariæ majalis, sapon. Veneti exsiccati, aa. ʒss. ol. caryophyll. olei bergamotti aa. gtt. ij.; and a mixture of ol. amygdal. express. ʒj., olei camphoræ ʒss., fl. tauri inspiss. ℈j., ol. cajeput. gtt. iv.; a few drops of which are to be dropped into the ear night and morning. Every evening a warm pediluvium is to be made use of, containing ℥ij. of mustard; small bags of herbs and camphor, oiled silk, and new bread and cummin seeds, chopped up together and still warm, are to be applied to the ear; carbonic acid gas is to be introduced into the meatus; and finally, even electricity is to be tried, either in the form of stream, spark, or shock, and in the most obstinate cases, the actual cautery and moxa to the mastoid process. But the subsequent part of the present work will prove beyond all question, that the forms of diseases of the ear *differ very essentially from each other, and by no means merely in degree;* that they are not different modifications of one and the

same fundamental form, or of one and the same character of disease. It naturally follows, therefore, that a mode of treatment which has been accommodated to these hypothetical principles, and is merely to be applied with increased energy, according to the supposed gradations of the fundamental disease, cannot in reality answer for the different forms of diseases of the ear, and must therefore plainly be rejected.

Admitting that the greater number of diseases of the ear are attributable to rheumatic-catarrhal causes, yet these diseases, however entirely they may be excited by one and the same cause, are still so differently modified by the different parts of the organ that are affected, and rendered so various in their pathological character; and from the peculiarly dense structure of the ear so rapidly acquire a high degree of individuality, that the productive cause is completely put out of sight in the treatment. But the longer the disease has already existed, and the more completely established are the organic changes to which it has given rise, the less ought the fulfilment of the causal indication to be relied on.

I cannot, however, content myself with this sketch of a systematic empirical treatment of diseases of the ear; for still more crude empirical principles are very generally entertained on this branch of medical practice. I am desirous of endeavouring to furnish a critique, as complete as possible, as well on the methods most usually recommended for the treatment of deafness in general, as on the most celebrated individual remedies.

They are divisible into remedies of local, and those of general action.

CHAPTER II.

REMEDIES OF LOCAL ACTION.

§ 1. *Electricity.*—I begin with the least curative of all, with a remedy, which, from the analogy it has always been believed to possess to the power that maintains the nervous influence, was naturally thought also to possess a mighty power of exciting and regulating the nervous influence. In theory, this opinion had everything in its favour, but in practice, even in nervous diseases, the results, in almost all cases in which it was tried, concurred in as loudly condemning it. This is most unequivocally shown in diseases of the ear.

Even in the middle of the eighteenth century, the Abbé Nollet (*a*), supported by his own investigations on the subject, declared himself very decidedly against the medicinal efficacy of electricity, nor was he refuted by the proofs in favour of its efficacy, that were adduced by Bertholon (*b*), Mauduyt (*c*), Comus (*d*), Poma, and Rainaud (*e*). These proofs are most superficially maintained, are unsupported by any careful investigation of the ear, and thus of no scientific value, nor of any influence in deciding the present question. Mauduyt (*f*), for example, treated ten patients labouring under difficulty of hearing, by electricity; of these, four were not at all relieved, and six derived some pretended improvement, that is to say, the first of these at the close of the treatment heard the watch at a distance of eleven inches, which he had previously heard at the distance of two: a month later, this improvement still remained.

(*a*) Encyclopédie, art. Electricité, 1755.
(*b*) De l'Electricité du Corps Humain, tom i. p. 502.
(*c*) Mem. de la Societé Royale de Medicine, from the year 1778.
(*d*) Journal de Physique, from 1775.
(*e*) Journal de Medicine, from 1787. November.
(*f*) Dict. des Sciences Med., art. Electricité.

The second, who was very deaf, heard at the close of the treatment, a moderate voice at the distance of three feet, which he also could do six weeks later. The third broke off the treatment after forty sittings, but *without being at all improved.* The fourth was *very little improved.* The fifth was eight months under treatment, obtained but slight improvement, and even this vanished completely, after four months. The sixth was four months under treatment, and the benefit acquired was again completely lost, after two months.

Cavallo (*g*) indeed asserts that deafness, except when occasioned by stricture, or by any abnormal organic condition of parts, is completely or partially cured by drawing small sparks from the ear by means of a glass conductor, or a stream of electric fluid by means of a wooden point. But he leaves us without any practical proofs, he does not give us a single case of deafness in which electricity had been advantageously employed, though he adduces a great number of ophthalmic diseases that had been successfully electrified. This authority may, therefore, also be put aside.

Le Bouvier-Desmortiers (*h*) has electrified only one deaf-dumb patient, and this twice a day for a month; the only result of which was, that the patient understood words spoken to him in a moderate tone of voice. But even the slight improvement which seems to have occurred in this instance must be considered doubtful, for the author gives no precautionary rules by which he guarded himself against the illusions which so frequently arise in consequence of the acute sight of the deaf-dumb, and the great attention they pay to the movements of the lips of the speaker, and the delicate common sensation they possess. He himself subsequently confesses that, after the termination of the treatment, the patient was as deaf as ever.

How difficult it is to find facts in favour of the efficacy of electricity in deafness, may be seen from this, that out of

(*g*) A complete Treatise on Electricity, vol. ii. p. 146.

(*h*) Mem. ou Considérations sur les Sourds-muets de naissance.

the 80 numbers of Hufeland's Journal, so rich in practical communications, only the 7th and 75th numbers contain detailed histories of cures of this description. It is there stated (*i*), that a young woman, twenty-one years of age, who from her youth had suffered from a varying degree of deafness, in consequence of her disease having suddenly become aggravated, a week previously and continuing so, was electrified on three different days, with evident increase of the tinnitus, but with the effect of again rendering her hearing good. The second case, also a first attack of deafness resulting from cold, was cured by being once electrified.

Both cases were treated by a non-medical man, and in neither case was there any investigation as to what part of the ear was the seat of the disease. Besides, the second case, from its recent nature, is quite unimportant. The first case proves nothing, for this reason, that the patient had frequently been relieved of her difficulty of hearing by changes of spontaneous occurrence, so that it is doubtful whether the improvement succeeding to the treatment might not be ascribed to some such change in the disease.

Busch (*j*) of Marburg cured the deafness of a sexagenarian by electrifying him ten times, after which a pop was suddenly heard, one morning, in the affected ear, and the hearing returned. Busch himself hints that obstruction of the Eustachian tube might have been the cause of the deafness, but he had not examined that canal. Supposing that such obstruction really existed, and that the electricity, perhaps by rendering the obstructing mucus more fluid, had contributed to its discharge, (which would have been effected with more certainty by a single air douche), this case affords the only example that I know of, in which the cure of deafness is in any measure to be attributed to electricity.

(*i*) Hufeland, Journal, vii. p. 169.
(*j*) Hufeland, Journal, lxxv. p. 70.

But how electricity still continued to be vaunted as a remedy for deafness, may be best seen in the example of Lentin (*k*).

He especially mentions the great advantage that electricity promises in deafness, when combined with the external application of irritating fluids, *e. g.* turpentine, &c.; but still he confesses that he *had not time to make the necessary investigations in order to communicate any thing certain on the subject, nor has he yet time.*

The subject has been, and still is, considered as a sort of stalking-horse on which every author on diseases of the ear must display himself, if he wish not to appear ignorant. The French physicians have most nearly hit the mark on this subject. Saissy (*l*) limits the use of electricity to incomplete paralysis of the auditory nerve without erethismus, but has never made trial of it himself, nor allowed such trial to be made. Itard (*m*) on this subject, declares from his own experience, that electricity *has no beneficial action on the ear;* in which Deleau perfectly coincides. The English physicians have not afforded us any certain practical information on this question, nor do they appear among the enquirers into the efficacy of galvanism and mineral magnetism, as a remedy for deafness.

All authors who speak of the indications for the use of electricity, are unanimous that it is only adapted to cases of a torpid character, free from excitement; but that erethismus, an increased excitability, as well of a particular organ, as of the organism in general, renders its application very hazardous. This latter form is unusually prevalent in nervous deafness, so that out of my 300 examples of diseases of the ear, 140 were cases of erethitic-nervous deafness, and only 12 of a torpid character. Of these 140, fourteen had been already electrified, when they came under my care.

(*k*) Beiträge zur ausübenden Arzneiwissenschaft, ii. p. 100 et seq.
(*l*) Essai, &c. p. 272. (*m*) Traité, &c. ii. p. 72.

They all appeared to have been made worse by it, though at first it seemed occasionally as though the electrical treatment would improve their condition. *In all, the erethismus and the tinnitus were increased.*

As yet, no instance of torpid nervous deafness has come before me in which electricity had been employed. But notwithstanding this, from the transitory action of electricity, and its non-adaptation to the vital power of the auditory nerve, I am not disposed to put confidence in this natural agent, even in torpid nervous deafness; and more especially from the great difficulty, or perhaps complete impossibility, of adapting the intensity of the electric action with sufficient accuracy to the power which the auditory nerve may possess of bearing excitement.

§ 2. *Galvanism.*—This has found as many and as noted admirers as electricity. In the beginning of the present century, not only did medical men galvanise, but even the unlearned of every description tried their success, on all who chose to submit themselves to their shocks and thumps.

Grapengiesser (*n*) made trial of galvanism with far too much enthusiasm to allow of his making any proper selection of the diseases of the ear which should be thus treated. We find no investigation of the cases galvanised by him, and therefore, all practical value must be denied to the principle which he professes to have discovered and established, in the course of his investigation, viz. "that when the proximate cause of the deafness is debility and paralysis of the auditory nerve, associated with deficient excitability, advantage may be expected from galvanism;" for he knew not in any of the cases treated by him, what was the morbid condition that he had before him.

Flies (*o*) confesses that in three patients labouring under diseases of the ear, he saw no advantage from galvanism, whilst in another case it was even prejudicial.

Of the sixteen cases of deafness treated by Grapengiesser,

(*n*) Versuche den Galvanismus, &c., 2te Auflage.

(*o*) Vide Grapengiesser, Versuche, &c., 2te Aufl. p. 226.

the favourable results in the *first* and *eighth* cases were shown by Augustin (*p*) to be false; the second patient went away just as the improvement began to manifest itself(!); the third was very immaterially benefited; the fourth again lost at the termination of the treatment the slight relief that he had acquired; the fifth was equally unfortunate, even during the treatment; the seventh was interrupted in his improvement by a catarrh; the ninth and tenth remained without any improvement at all; the twelfth only heard the works of a watch, (at what distance?); the thirteenth experienced a complete relapse after the treatment; the improvement in the fourteenth very soon became stationary; the fifteenth was only so far benefited as to be able to hear some words by the aid of an ear-trumpet; but the sixth, eleventh, and sixteenth are to be considered as having been completely cured. Even these three apparent cures, however, lose all their importance, for Grapengiesser has not described the peculiar nature of the morbid condition in these cases, nor has he stated how long the improvement lasted.

Augustin (*q*) asserts, in the same superficial way, that he has relieved two patients labouring under dulness of hearing, by means of galvanism; but even he himself makes this improvement of no value, for he confesses that the improvement arising from the galvanic treatment does not last.

Dr. Th. Fr. Walther (*r*) cured a case of deafness arising from nervous fever, but only more speedily than it *disappears spontaneously after fever;* a second case is very obscurely detailed, and has afforded no definite result; the third and fourth patients very soon abandoned the treatment, in consequence of the unpleasant sensations attending the galvanism; so that neither is there any favourable case detailed here. Three other cases given by Dr. Bremser are equally indefi-

(*p*) Versuche einer Vollständigen Syst. Geschichte, &c.

(*q*) Versuche, &c. p. 260, et seq.

(*r*) Ueber die Therapeut. Indic. u. den Techic. der Galvan. Operat., Wien., 1803, p. 164, et seq.

nite. In none of them was the ear examined; it is merely said that the first patient suffered from headache and tinnitus, and was so far benefited that he could converse without hesitation; the second "could not catch even moderately low sonorous vibrations, at the termination of the treatment;" the third patient heard, with the ear that was previously deaf, any rather loud tones, and with the ear that was merely impaired, every previously audible vibration of sound.

The vain boastings of Sprenger (*s*), the apothecary, are devoid of all intrinsic credibility; without giving any details, he asserts that he has cured forty-five deaf-dumb persons, and almost all those labouring under dulness of hearing, whom he took under treatment. In Eschke, Pfaff, Pfingsten, Schubert, and others, who calmly tried his plan, he has met with severe but righteous judges.

Eschke, senior (*t*), declares that galvano-voltaic electricity has never in any instance been shown to be a means of strengthening the sense of hearing. In the Berlin Institution for the deaf-dumb, it was tried in a scientific manner, (though perhaps rather too powerfully,) in eighteen deaf-dumb persons; and even, towards the close of the treatment, associated with douches, shower-baths, and whippings with nettles, &c., without however effecting the least improvement the hearing. In many cases this treatment has proved injurious, not merely to the general health, but also to the hearing, exciting pain, inflammation, &c. Twelve cases of dulness of hearing that were submitted to the same treatment, derived equally little benefit.

Pfaff (*u*) details the results of his attempts in three deaf-dumb patients, the first of whom derived no benefit, and the second and third some improvement, which though it con-

(*s*) Anwendungsart der Galvani-Volt. Metallelectric. z. Abhülfe der Taubheit, &c., 1802.

(*t*) Galvanische Versuche, 1803.

(*u*) Nordisches Archiv. &c. ii. 729, iii. 1, p. 242.

tinued, is not represented as a cure. In the later numbers of the Archives, no mention of the subject again occurs, in spite of the interest which Pfaff takes in it. Treating these observations, therefore, as their author has done, they may be set aside.

Pfingsten (*v*) tells us, that his trials of galvanism, persevered in for four months, have afforded only negative results. The fear lest he might have applied the remedy too strong induced him to renew his trials in a much milder and more careful manner, by means of a simple, scarcely perceptible current; but even by this means he succeeded only so far that one child, eleven years of age, could repeat the vowels; a second deaf-mute was, on the third day rendered worse by the treatment; and three others, after being galvanised for weeks, showed no signs of improvement.

Dr. Castberg (*w*) treated in this way thirty-three persons labouring under dulness of hearing; some for three, some for two, and others only for one month at a time; in all he remarked, during the first six or ten days of the treatment, a decided diminution of the tinnitus and an improvement in the hearing, which however was, in every case, again completely lost, after the period above stated.

Schubert (*x*), speaking of the results of his galvanic labours pursued for eight months, very honourably and frankly declares that this mode of treatment so increases the irritability, not only of the ear, but also of the whole organism of the deaf-dumb, that, as the treatment is persevered in, they can only endure the galvanic action when constantly diminished in strength; that by this increased irritability they are indeed enabled to catch sounds which they could not previously hear, and this state is the more permanent the more the irritability of the system is augmented by low diet, strong purgatives, &c.; but, when the original strength of

(*v*) Nordisches Archiv., &c., iv. 1. p. 56.
(*w*) Idem, iii. 3. p. 74.
(*x*) Von der Anwendung des galvan. bei Taubgebornen.

body is restored, the morbid irritability excited in it entirely disappears also, and along with this the increased susceptibility of the ear for sound, even ere yet the galvanic treatment has terminated. Schubert therefore declares, that it is no longer a matter of doubt with him, that deaf-dumb patients thus relieved, again relapse into their original state of deafness.

Itard (*y*) states that all the patients galvanised by him and by other Parisian physicians, either at first heard better and afterwards much worse; or the slight improvement soon became stationary, in spite of perseverance in the treatment; or else, no improvement whatever was manifested.

Looking at the result of all this accumulated experience, given with the most scrupulous honesty, there cannot be one moment's hesitation in declaring, that electricity and galvanism are utterly useless in diseases of the ear, that they even seriously endanger the auditory nerve by exciting to a morbid degree its irritability, the infallible result of which is, that it is positively debilitated.

I reject, therefore, the use of these two great natural agents, in any disease of the ear, and the more decidedly since I have learned from repeated experience, that almost all those patients who had been early electrified and galvanised, whose nervous deafness urgently required gentle invigoration of the auditory nerve, no longer bore the mildest invigorating remedies (in consequence of their excited and too highly increased irritability,) and thus had, artificially, been rendered incurable.

§ 3. *Mineral magnetism*,—from its close affinity to electricity and galvanism, leads us to expect *à priori* the same results from it in diseases of the ear, and these have been completely confirmed by experience. It is indeed worthy of remark that but few testimonies in its favour are to be

(*y*) Traité, &c. ii. p. 72.

found. Neither Baldinger (*z*) nor Andry and Thouret (*a*) give even a single fact relative to the efficacy of the mineral magnet in diseases of the ear. Becker (*b*), almost the only one who has laid before the public the results of an extensive practice with the mineral magnet, and of a scientific mode of using it, communicates only three cases that can be here adduced. The first of these occurred in the practice of Dr. Unzer, and relates to a patient, who was cured by means of the mineral magnet, in the course of eleven days, of a deafness of the left ear that had existed for twelve weeks. The second patient, a man fifty years of age, had been attacked by pulmonary catarrh and violent tinnitus, consequent on cold. The magnet, with the feeder introduced into the ear, excited in it heat and a feeling which the patient described as resembling some manufacture in the ear; without the feeder the action was feebler; the tinnitus disappeared, and he heard better with the ear. This improvement lasted two hours. Becker magnetised him six days longer successively, the result of which was, that the tinnitus entirely left him, and he heard again with the enfeebled ear as well as before. In the third case, tinnitus arose in the same way from cold, was rendered worse by the magnetising, and afterwards ceded to the application of two leeches.

Of none of these three cases is the peculiar nature determined; we know not whether it was an affection of the external, of the middle, or of the internal ear; the first alone can properly be considered as the history of a cure; in the second case the affected ear was merely left as bad as it was before; and in the third case, two leeches carried off the palm from the magnet. Besides, the last two cases were quite recent, attendant on a catarrhal affection, and probably

(*z*) In Opuscula Medica. Narr. succincta de magnet. virib. ad morbos sanandos.

(*a*) Beobb. u. Untersuch. über d. Gebrauch d. Magnets in d. Arzneikunst, 1785.

(*b*) Der mineral. Magnet. u. seine Anwendung in der Heilkunst, 1829.

depended merely on a slight obstruction from mucus at the mouth of the Eustachian tube, which many patients take no farther notice of, for Becker makes particular mention, only of the tinnitus, and not of the accompanying deafness.

Von Bulmerincq (*c*) details only a single case of disease of the ear, the history of a lady forty-seven years of age, who, for a series of years, had become more and more dull of hearing. In this case, on applying the magnet, tinnitus and increased heat of the head were excited; and scarcely two hours after, both were augmented to such an insupportable degree, that it was necessary to put aside all the magnets. The author, indeed, imputes this bad result to his defective mode of procedure; but I do not find in any part of his work that a better mode was attended by any better success.

These four cases (two of which represent magnetism as absolutely injurious, and the other two, from the defective manner in which they are given, say nothing in its favour,) are all that I have gained from the literature extant on the subject of mineral magnetism as a remedy, after which one cannot feel disposed to institute new trials. But any opportunity for making such trials will be decidedly rejected, on hearing the results of the magnetic treatment very lately tried in Berlin.

In the summer of 1834, Dr. Schmidt of Philadelphia (?) (*d*) vaunted the powers of mineral magnetism in deafness and in tinnitus, in the political journals and in one of the medical periodicals of this country, and even obtained no little credit for the cure of such affections. In spite of all my endeavours, I have not succeeded in finding even a single case of any disease of the ear that had been treated successfully by Dr. Schmidt; but I know well that Mr. Von Beguelin of this place, and Mr. Von Trembiczki, both

(*c*) Beiträge zur ärtzlichen Behandlung mittelst des mineralischen Magnetismus, 1835.

(*d*) Hufeland, Journal, 1834. Sept., p. 117.

labouring under nervous deafness, have been magnetised for fourteen days successively, by this physician, without any success.

After the departure of Dr. Schmidt, a Mr. Bahrdt followed in his footsteps, but without being at all more fortunate in his treatment of diseases of the ear. Among the many patients labouring under diseases of the ear that were magnetised by him, I may allude in particular to a Miss Markstein, Mad. Perez, a student at Mangelsdorff, and Mr. Justice S——, as instances in which not the smallest beneficial change in the aural affection ensued from the treatment. Mad. Grossman, who probably might be adduced as a proof of the beneficial action of mineral magnetism, cannot here be considered as such; for this lady had already been previously treated by me, with marked improvement of her dulness of hearing and tinnitus. She had been treated by the introduction of ætherous vapour into the cavity of the tympanum, the permanent influence of which, after the termination of the treatment, remained indubitable. During the continuance of this influence, the mineral magnetic treatment took place, the patient having naturally preferred so convenient a method, to the inconvenient catheterism of the Eustachian tube.

Dr. B., a regimental physician, also applied the magnet for the cure of nervous deafness, *e. g.*, in the case of Mr. Brodbeck of this place. During the first four of the eight sittings, the tinnitus was calmed, and for some hours he heard better; during the last four sittings, however, the opposite effect was produced, and in consequence of the severe dragging and throbbing in the ear, the patient could not be induced to persevere in the magnetic treatment.

The same physician treated Mad. T——pel, who laboured under a very high degree of nervous deafness, and had already been so mistreated by electricity, and many other violent local remedies, that the hearing was scarcely at all benefited by the application of ætherous vapour under my own direction; the nervous head-ache and the tinnitus were,

however, almost entirely removed. Probably from being dissatisfied with the insignificant improvement in her hearing, (the hearing distance having increased from one line to three inches,) the patient submitted to Dr. B.'s mineral magnetic treatment, and at each sitting was delighted to find that the tinnitus still farther diminished; but half an hour afterwards, she always returned to her former condition, so that successive sittings, during four weeks, afforded no other than this temporary result. I found, subsequently, that the hearing distance amounted to only one inch, instead of three. Since this period, I have heard nothing of the patient, and have been the less anxious to hear, since it is generally admitted that mineral magnetism is of little or no efficacy.

Farther, Dr. Barriés of Hamburg has treated a Mr. Wald of Stettin, a very robust young man, who laboured under nervous deafness, with a slight catarrhal affection of the Eustachian tube; but though the mineral magnet was applied daily for four weeks, not the slightest, not even temporary success was obtained. Nor has Dr. Barriés succeeded any better in his treatment of the deaf-dumb in the institution of this city. On this occasion he made use of a very large and very powerful magnet; so that the little success that attended his treatment cannot at any rate be attributed to the too feeble action of the magnet. For three months, he treated more than fifty deaf-dumb persons, partly with his magnet and partly instructing them by signs; after this period, his treatment was interrupted, as the superintendent would not allow the simple method by instruction, attaining its object more certainly, to be put entirely aside, for the sake of an uncertain result. But, in the meantime, Barriés willingly gave up his undertaking, that he might appear to have been restrained in his mode of conducting it. The results of his efforts have been examined by a commission and laid before the authorities. I am not able to give any further particulars on the subject, but this much I cannot allow to pass unnoticed here, that in estimating the apparent progress of the deaf-dumb in hearing and

speaking, the following things should be carefully remarked.

First, that Dr. Barriés neglected at the commencement of his treatment, carefully to determine in each deaf-mute, how far the faculty of hearing still existed, and how far it had been improved by the previous long-continued instruction in speaking.

Secondly, that he did not hesitate in his instructions of the deaf-dumb, to render the repetition of words directed to their ears, more easy by his slow enunciation of them before their eyes, and by the additional aid afforded by speaking with his fingers, when the ear could not interpret the sound. In this way, the pupils learned words and whole passages by heart, and were easily able to repeat them; because they returned in a certain consecutive order, and the delicate common sensation that the deaf-dumb possess throughout the whole cutaneous surface, assisted them in distinguishing the words addressed to their ear, by the different impulses of the atmosphere. This accords perfectly with Dr. Barriés' notion, that the deaf-dumb must, in the first place, learn to speak by means of their powers of perception, and only subsequently by means of their hearing.

Whether this opinion be correct or not, must be proved by the cures that may have been effected by this plan; but those cures said to have been effected by this method at Hamburgh, are attested by no other authority than that of magistrates, which, on such a subject, cannot by any means be considered sufficient.

In the institution of this place for the deaf-dumb, I had an opportunity of observing, at least in some measure, more closely the progress made by his pupils. Of 58 he pointed out 14 as *hearing perfectly;* but two of the best of this class, named Carwin and Pagel, were never once able to hear the powerful works of my watch when placed close to their ears, though the same watch can be heard by an ear that hears perfectly well, at a distance of thirty feet. It is true, however, that both these pupils repeated phrases that they

had practised, *e. g.* "Vienna, Berlin, Petersburg is the capital of the north, &c." but even the most simple words that they had not read or learned in some other way, and which they could not distinguish by means of the impression made on the ear through the impulses of the atmosphere, they could not repeat, however loudly they were shouted into their ears. One of them, for example, could not at all comprehend the word "Potsdam," until each letter had been rendered intelligible to him, by the known and easy method of repeating them with the lips and fingers, which he, "as hearing perfectly," ought rather to have understood by means of his ear. What the pupils could really comprehend by their hearing, was nothing more than what the galvanic action has indeed effected in innumerable instances in the deaf-dumb; that is to say, it enabled them to catch many sounds, which previously, they could not do, in consequence of the temporary increased excitability of the auditory nerve. In this way, extremely illusory results may very easily be obtained, from the ignorance of the spectators with regard to what has already been done, and from the ready use which the deaf-dumb make of that instruction in speaking which they have already received; but such results will not stand the test of criticism, nor even of time.

§ 4. *Moxa and the actual cautery*,—have each been repeatedly and urgently recommended in obstinate diseases of the ear; but always either merely with a view to fulfil some causal indication, *e. g.* a supposed metastasis to the auditory nerve from a repelled eruption of the head; or from the equally hypothetical notion of a paralysis of the auditory nerve: or else they have been used in an entirely empirical way, simply because the case in question was considered very obstinate, *i. e.* one which had not yielded to the remedies in common use. But none of these reasons can justify the use of so powerful and destructive a remedy in diseases of the ear, in which no remedy ought to be selected till after a careful and thorough investigation of

the organ. I cannot here attribute any importance even to Itard's (*e*) recommendation; for though he recommends the moxa in paralysis of the auditory nerve; out of 172 cases which are given in his work, only a single one occurs (*f*) in which the actual cautery had been employed; whilst, in order to overcome the very necessary objections to the use of so heroic a remedy, its recommendation should be supported by a series of convincing observations and experiments. Till such experiments are laid before me, I must consider moxa and the actual cautery as remedies, which in any point of view are too powerful for the auditory nerve, and have been mentioned by each writer on acoustic medicine up to the present time, only for the sake of their own reputation, and in order that they might not appear to omit any thing.

§ 5. *Blisters and tartar emetic ointment applied behind the ears*,—are elevated (especially the former) to the rank of domestic remedies, and in general are applied for diseases of the ear of every kind, without any distinction. If it must be granted that in many slight cases blisters are not injurious, it is because from the naturally short course of the disease they are soon allowed to heal; but in all obstinate diseases of the middle ear they are of no use whatever; in nervous deafness they are even positively injurious, and are only indicated in topical circumscribed inflammatory affections of the meatus and of the membrana tympani, though even here they are often rendered useless by remedies introduced directly into the meatus. If in the above-mentioned cases, blisters do not soon render the service expected from them, they should at once be replaced by tartar emetic ointment, which I am in the habit of using, from the first, without having recourse to blisters. This I allow to be rubbed in below the mastoid process, in order to avoid all risk of caries; and even here I do not readily suffer the suppuration to be kept up longer than

(*e*) Traité, &c. p. 75, 328. (*f*) Idem, p. 390.

fourteen days, from behind the same ear. It is, indeed, better to submit each ear alternately to the action of the ointment.

§ 6. *Issues*—in the arm have never appeared to me to exert any essential beneficial influence on the diseased ear; though I have had very frequent opportunities of making observations on the subject. At the present time, I have a patient before me suffering from chronic inflammation and tumefaction of the mucous membrane of the Eustachian tube and fauces, for which he has worn an issue containing *twenty peas*, in the left upper arm, for a year and a half, without deriving the smallest benefit. Instead of the throat being benefited by this derivation, so great has been the loss of fluids from the body, that he feels extremely weak and enervated, and has lost much flesh. The inefficacy of such derivative means, in chronic inflammatory conditions of the mucous membrane of the Eustachian tube and cavity of the tympanum, is rendered still more evident by stating, that this same patient has kept up free suppuration, for nine months, by means of tartar emetic ointment from a spot on the top of the head, of the size of a half-crown piece, and with equally little advantage, though the development of his ear disease had preceded the spontaneous cure of a chronic tinea capitis.

§ 7. *Of setons*—in the neck the same holds good as of issues; there does not exist a single case in which these have been made use of with undoubted advantage in diseases of the ear, and in which, at the same time, the affected organ was carefully examined, where the same result would not have been obtained by milder and more certain methods; whilst all those patients that I have seen who had worn setons, have unanimously described their influence on the aural disease as injurious. In nervous deafness, the difficulty of hearing and the tinnitus are increased by setons. In organic diseases of the middle ear, they in no way remove the chronic inflammatory condition; and in diseases of the external ear, it is cruel not to dispense with so powerful

a remedy, by substituting for it the tartar emetic ointment behind the ear, (an equally powerful derivative,) and remedies acting directly on the meatus.

§ 8. *Douches*,—within and behind the ear, whether of simple water, or with the addition of other irritating substances; or, whether consisting of simple vapour, or of the vapour of mineral waters, *e. g.* of Toeplitz, Wiesbaden, &c., are absolutely dangerous to the ear, when employed as means of exciting the auditory nerve. With the exception of accumulations of ear-wax, (which, however, are best and most conveniently removed by means of a small hand syringe,) there is no kind of disease of the ear that affords a rational indication for douches to the external meatus, whether of water or of vapour. It will be shown, farther on, how absurd it is to attempt to remove obstructions of the Eustachian tube by means of water douches introduced by the meatus through the perforated membrana tympani (*g*), though this admits of being accomplished with perfect convenience and certainty, simply by introducing the douche into the Eustachian tube through the catheter.

§ 9. *Drops and injections*,—especially those of an acrid, spirituous, irritating class, from established custom, and almost invariably without any other indication than a somewhat defective secretion of wax, are unfortunately made use of to the great injury of the patient. Inflammation and tumefaction of the meatus, which extends over the auricle and is occasionally very painful; inflammation, thickening and opacity of the membrana tympani; and excitement of the auditory nerve consequent on these inflammatory accidents, are the usual results of such irritating external applications. When they appear to be of use, it is only for a time; the result of the increased irritability of the whole organ, which is associated with the inflammatory excitement of any one particular part. Increased difficulty of hearing always succeeds to this temporary improvement,

(*g*) Itard, Traité, &c. ii. 227.

though fortunately, time often removes this deterioration, if the application of such pernicious external remedies is not obstinately persisted in.

According to this view, the recommendations and modes of action of the various secret remedies in use for the cure of deafness, which are all compounded of medicaments of the above class, must be judged of, or in other words they must be rejected as absolutely injurious; and the more so indeed, as there is no remedy for deafness or dulness of hearing in general, but only for individual diseases of the ear that have been proved by careful investigation. The most popular remedies of this category are :

The acoustic oil of Mêne Maurice, of Paris, which is to be procured either direct from him, or from his agent, John Kühl, of Hamburgh. This, according to the declaration of the discoverer (*h*), is to " strengthen the glandular structure secreting the cerumen, and give power to the auditory nerve." If, however, the oil does not succeed, a number of other secondary remedies, as he terms them, are made use of; plasters to the nape of the neck and behind the ears, purgatives, &c., which cost much money and merely end in empty quackery. I can assure my readers, that I have frequently observed that patients, who had laboured under simple catarrhal affections of the Eustachian tube, had not derived that benefit from all the artifices of Maurice, which was afterwards very readily acquired by the use of injections into the Eustachian tube, or other appropriate means. Other patients were very seriously injured by the obstinate continued use of all the derivative means enjoined in Maurice's pamphlet. The cases which Maurice has appended to his small pamphlet, are devoid of all scientific value, and in superficialness quite worthy of so purely a commercial speculation.

Cajeput oil, camphor, opium, onion-juice, oil of cloves, tincture of castor, eau de Cologne, and innumerable other

(*h*) Traitement des Maladies de l'Audition. Paris.

remedies, which do not admit of being recounted, must be considered as absolutely injurious when introduced into the meatus, as is often done, merely on account of toothache. Instead of mentioning all the particular remedies of this class, I will only take tincture of castor as an example, of itself a mild application, and which from the repeated recommendations of both ancient and modern authors, I have been induced several times to apply to the external meatus, when there was great aridity and deficiency of cerumen, and where the deafness was purely nervous. I prescribed only one part of tincture of castor, to be mixed with two parts of white French wine, and only three drops of this mixture, on a little cotton wool, to be introduced into the meatus, night and morning. But even this very cautious application soon gave rise to slight heat, which in several instances passed into active inflammation and tumefaction of the meatus, accompanied with violent tickling, inflammation of the auricle, and even tumefaction of the whole face, with great difficulty of hearing and tinnitus; so that from these accidents it may be readily calculated what is to be expected from other much more acrid applications.

These remedies are most injurious when introduced into the meatus in the form of ointment, as for example, is the case with the red eye ointment (red precipitate), and other similar ointments.

Even the "oleum hyoscyami" (*i*) acts injuriously on the organ of hearing and its function, notwithstanding the strong recommendation of it by Jos. Frank (*j*).

Warm fomentations, injections of warm milk, the vapour of elder and camomile flowers, &c., slices of hot bread, with juniper oil, &c. dropped on them, kept applied to the ear till they cool, and many other similar remedies, are mere playthings by which the patient is amused, because the practitioner can do nothing better. But though by these means there is not much harm done, as the remedies are mild

(*i*) In the original, "oleum hyoscyami coctum et infusum."

(*j*) Prax. Medicæ, &c. ii. i. sect. 2 b, p. 947.

and insignificant; still, that time is thus wasted in which something better might have been effected. If, however, the fomentations, though consisting merely of infusions of elder and camomile flowers, wormwood, and the like, are introduced into the ear very hot, and even by means of a funnel; if the slices of bread are applied very hot, and hot vapour douches introduced into the ear, the injury produced even by these is serious; they excite great congestion in the ear, and inflammatory affections of the meatus and membrana tympani, with all their pernicious consequences.

§ 10. *Leeches*—are frequently applied, especially, when tinnitus exists, with a view to relieve the hypothetical congestion. They are, however, applied not only to no purpose, but even to the positive injury of the patient, in all those cases, so very common, where the tinnitus arises from erethismus of the debilitated auditory nerve. Topical bleeding is only called for in acute inflammatory affections of the ear, and then indeed in the most urgent manner.

CHAPTER III.

REMEDIES OF GENERAL ACTION.

THESE are remedies, which by modifying the vital action, and altering the degree of power throughout the whole system, are intended to react beneficially on the affection of the organ of hearing; but, with very few exceptions, it is in vain to expect from them any such reaction. This will not be thought surprising, on taking into consideration the small supply of fluids which the ear possesses, as well as the very unimportant anastomosis of the auditory nerve with the rest of the nervous system. For the whole of Jacobson's (*a*) anastomosis only supplies the cavity of the tympanum, viz. its mucous membrane, with organic twigs; and the two connecting filaments which Arnold and Varrentrapp have noticed between the "nervus facialis" and the "nervus auditorius," are not incorporated with the filaments of the auditory nerve, but the fibres proceeding from the facial nerve are merely placed in apposition with those of the auditory nerve, for the purpose of regulating the functions connected with the organisation of the labyrinth. Both vessels and nerves, however, are the chief media of sympathetic and antagonist actions, so that from these, but an extremely small, scarcely appreciable influence on the auditory nerve can be expected.

Constantly repeated corroboratvie experience gives to these theoretical principles the greatest importance. Even such diseases of the ear as have arisen from some general affection, *e. g.* a general catarrhal affection of the respiratory organs that has been transferred to the cavity of the tympanum, are only with the most rare exceptions removed (*according to my experience, never*) by the most powerful general remedies, to which the general affection cedes; but they always yield with the utmost readiness

(*a*) Müller, Physiologie, 1, 2, p. 768, 749.

to topical remedies properly applied. General remedies, however, are certainly altogether useless, where no such evident indications present themselves. Even erethitic nervous deafness, existing in an infirm body, and which has been produced by want and misery, does not yield in the least when the patient's poverty has been relieved, and he again enjoys renewed bodily strength; the aural affection continues undisturbed, though it is less insupportable than before, in consequence of the invigorated mental condition of the patient, and thus arises the illusion, that the aural affection is really improved. At all events only very slight, recently established diseases, which do not involve the interior of the ear, and which have not yet become complicated with important disorganisations, can be occasionally made to yield to general methods of cure. Thus, slight rheumatic otalgiæ may yield to sulphur baths, and slight inflammatory affections of the glandular integument of the meatus in scrofulous subjects, to a general anti-scrofulous treatment. But if the above conditions occur in entirely opposite circumstances, the high degree of independency which the aural affection soon attains, and the peculiarity of the structure of the ear, demand a well directed topical plan of treatment, to the utter disregard of general remedies, unless these are rendered necessary by the simultaneous existence of other diseases.

§ 1. Among remedies which act generally, but which are of no efficacy on the organ of hearing, *Russian vapour baths*, unfortunately, stand preeminent; probably because, from the presumed origin of most diseases of the ear from cold, it was hoped in this way best to fulfil the causal indication. In place of all further discussion on the subject, I may state from my own observations, which I have had hundreds of opportunities of repeating, that no essential relief of any kind whatever, not even of a remote kind, to say nothing of actual cure, has hitherto been effected by *Russian baths in any kind of aural disease.* Quite recent, slight affections

are the only exceptions that I can make to this statement, but of all others, these least require a remedy that acts so violently as the Russian bath. The blind reliance on these baths as a remedy for all kinds of deafness goes so far, that, only a few weeks ago, an esteemed physician of celebrity recommended Russian baths without any farther delay to a child thirteen years of age, who suffered from *complete obliteration* of both meatus, simply because the disease had arisen after cold during measles. The physician had not considered it necessary to look into the meatus, where he would have been surprised to find a disease which would certainly have bid defiance to the projected treatment by baths. How often have I seen patients, whose membrana tympani was more or less destroyed, who had been suffered to submit to a great number of Russian baths, simply because an otorrhœa existed, and the disease had set in after the application of cold. Even here, no notion was entertained of the disorganisation of the membrana tympani. The most simple obstructions of the Eustachian tube have hitherto always withstood vapour baths; innumerable times have they failed to loosen a plug of viscid ear-wax, &c.

§ 2. *Salt-water baths*—are almost as frequently recommended, especially when nervous deafness, or a general affection is presupposed to exist, with the expectation of remedying the latter by the sea-bathing, and thus indirectly, of acting powerfully on the aural affection. But, unfortunately, the result is far otherwise; however much the general system may be invigorated on leaving the sea, the tinnitus becomes still more violent, the dulness of hearing increases; nay, even many a frequenter of marine bathing-places, who previously had remarked nothing unnatural in his ear, has felt himself most unexpectedly affected with tinnitus and dulness of hearing, which yield to none of the ordinary methods of treatment, nor to any independent aid from nature.

Watering-place practitioners have but little consolation

at hand for such unfortunate patients, and in general have not the candour of J. D. W. Sachse (*b*) to declare, that the sea water undoubtedly diminishes the power of hearing; principally from the cold, and the mechanical violence with which the salt water is driven by the force of the waves and of the tempest into the meatus, and against the bony case of the organ of hearing. Many patients are even advised by watering-place practitioners to hold the affected ear directly against the rushing wave!

Warm baths, sulphur, steel, and other baths, are always injurious to patients suffering from affections of the ear, when the use of them is attended by great excitement and congestion of the head and ear. When there is no such injurious augmentation of vascular action, they are still only admissible when some simultaneous general affection urgently calls for them.

§ 3. *Emetics*,—in the mode in which they are made use of for amaurosis, have but seldom, and then always without any advantage, been had recourse to for nervous deafness. Curtis(*c*), and even Itard (*d*), made trial of them in catarrhal affections of the Eustachian tube. In very recent slight cases, where the collection of mucus merely closes up the mouth of the Eustachian tube, emetics may accomplish the desired effect; but if the mucous accumulation extend to the cavity of the tympanum, as is the case in by far the greater number of instances, nay, in all those that come under medical treatment, it is beyond the sphere of the action of emetics, even repeatedly exhibited. A very temporary alleviation, at the utmost, is all that can be reckoned on, which is the less a sufficient recompense for the severe procedure by vomiting, as we possess so convenient and certain a method of effectually curing mucous engorgement of the Eustachian tube and cavity of the tympanum.

(*b*) Medicin. Beobb. und Bemerk. i. Bd. p. 213.
(*c*) Essay on the Deaf and Dumb.
(*d*) Traité, &c. ii. p. 215.

§ 4. *Purgatives*,—since the time of Hippocrates, have been so earnestly recommended for deafness, that scarcely a patient has gone through the ordinary method of treatment (*i. e.* a plan of treatment, of which topical investigation of the ear forms no part,) without being well purged. Purgatives are only admissible in acute and chronic inflammatory affections of the ear, as secondary means; but must always be held to be injurious in nervous deafness, in which it is imperatively necessary to husband, as much as possible, the forces and nutritious juices of the patient; but, above all, is it absurd to hope to cure tinnitus by means of purgatives, for it is very seldom indeed that, in chronic affections of the ear, this symptom depends on congestion of the ear.

Though Vering (*e*) assigns the highest reputation to aloes as a remedy for impaired hearing, it is but in a very limited sense that this opinion can be considered valid; and moreover only in those patients who, during convalescence from gastric nervous fevers, labour under dulness of hearing, which disappears spontaneously in course of time; but this action in no way depends on the purely hypothetical *sympathetic* connexion assumed by Vering to exist between the liver and the organ of hearing.

§ 5. *Bleeding*,—generally speaking, is employed with advantage, only in febrile inflammatory diseases of the ear, or when there is very striking evidence of plethora in the patient. It but seldom happens (and it is an irremediable error when it does) that bleeding from a vein is resorted to empirically in nervous deafness, for the cure of tinnitus, whence an incurable increase of the tinnitus is sure to follow. If, in particular cases, after such a step, the tinnitus diminishes, or, perhaps, altogether vanishes, this occurs only in consequence of the rapid sinking of the vital power of the already debilitated auditory nerve. A marked increase of the attendant deafness never fails then to take place, and proves irrefragably that the diminution of tinnitus is in this case but a very fallacious sign of improvement.

(*e*) Aphorismen, i, c. p. 40.

§ 6. *Salivation, &c.*—From hypothetical notions (which, however, have never yet been confirmed by accurate examination of the ear during the life of the patient) respecting exostosis and metastasis to the ear, the crudest empiricism has seen cause for resorting to salivation, and treatment by starvation and inunction. It is, however, my firm conviction, that these can never be indicated by *any disease of the ear as such.* Instances are not wanting of patients, who have not been freed of even simple chronic tumefaction of the mucous membrane of the Eustachian tube, after undergoing the most severe treatment by starvation and salivation, nor has more been accomplished by the most energetic use of Zittmann's decoction. Dr. Fritz of Prague (*f*) assures us, indeed, that he has cured fourteen deaf persons(!) by means of Louvrier's treatment by inunction, after all other remedies (but what remedies?) had completely failed. Two others were much relieved. But this experience, so superficially detailed, merits not the least regard here, for Fritz did not examine the ears of his patients, and thus acquired no knowledge of the peculiar nature of the morbid condition in each case. The remedial attempts that were made; previously to the treatment by inunction, were merely of a crude empirical kind; whilst it is my firm persuasion, that a well directed plan of treatment would have rendered this method (by which the life of the patient is always placed in jeopardy) at least superfluous.

§ 7. *Arnica flowers.*—I shall make mention of only one other of the general methods of cure, the use of *arnica flowers*, since in this particular some have professed to see an advancement in acoustic medicine.

A sprightly child, nine years of age (*g*), became suddenly deaf of both ears, after having violently heated himself by running and subsequently getting chilled. He continued without fever or pain, nor did he lose his gaiety, but com-

(*f*) Salzburger med. chirurg. Zeitung, 1828, August.

(*g*) Medicin. Zeitung des Vereins für Heilk. in Preussen, 1833, 14th August.

plained continually of singing in his ears. The external meatus was sound, (no investigation of the Eustachian tube was instituted.) "I believed," says the practitioner who treated the patient, "the case before me, to be one of sudden paralysis of the auditory nerve, caused by rheumatic metastasis. Fomentations, vesicatories, tartar emetic ointment, sudorifics, injections of tepid elder-juice, (into the sound meatus!) warm baths, and poultices of hot bread and juniper berries applied to the ear, were all made use of without success. He was galvanised for a month with the like result, and finally the dulness of hearing was completely cured by a three weeks' use of an infusion of arnica flowers." In this case no investigation was instituted as to the peculiar nature of the patient's disease. On general grounds, the practitioner believed the case to be one of paralysis of the auditory nerve, whereas an examination of the Eustachian tube would in all probability have afforded him special reasons for considering with certainty that mucous engorgement of the Eustachian tube and cavity of the tympanum, was the cause of the tinnitus and of the dulness of hearing, and which he would thus have been led to treat accordingly. For such cases frequently occur, as will be seen farther on. Without having instituted this highly necessary investigation, the practitioner suffered his unfortunate patient to be subjected to a whole host of painful and severe remedies; and merely because the arnica had the good fortune to be employed last, and at a time when the affection might have yielded to any unknown circumstance, it had the exalted honour of being considered as a peculiar remedy for paralysis of the auditory nerve arising from rheumatic metastasis!

If, from this sweeping criticism of general curative plans for diseases of the ear, it should be supposed that I wish to consider these diseases as entirely isolated, and quite independent of any connexion with diseases of the rest of the system, I here formally protest against such a conclusion. It is, on the contrary, my most decided conviction, that in

any, and especially in chronic disease of the ear, the general condition of the patient must be most carefully regulated according to the rules of general and special therapeutics; but not for the purpose, or in the expectation, of in this way relieving or curing the aural affection, which will certainly not be the case; but in order thus to clear the soil and level the ground on which the superstructure of the special treatment of the aural disease may and ought to be erected.

But by far the greatest number of diseases of the ear, are of a simple nature and not accompanied by general diseases, which stand in any intimate connexion with the local affection. The cure of this large class can be expected only from a method of treatment carefully adapted to each particular morbid condition; this, however, can naturally be accomplished, only by a very carefully instituted examination of the ear. This local investigation of the external and middle ear is, therefore, the first thing that is necessary for the patient who is to submit to any mode of treatment; the first thing that must be accomplished by any medical practitioner who undertakes the treatment of a patient. Without a careful thorough local investigation of the affected ear, the cure of deafness, on which the happiness of the patient's life frequently depends, is left to the arbitrary disposal of the blindest chance. I will merely adduce one out of many examples, by which my readers will be strikingly convinced, that without local investigation, diseases of the ear very frequently assume an incurable character, which might very easily have been prevented by timely information and treatment.

Out of 300 patients I found 35 suffering from chronic inflammation of the membrana tympani, which in 28 of these was already partially destroyed; and this, without the practitioners, by whom they had previously been treated, having had the least conception of either the one or the other of these morbid conditions of this delicate membrane; they had not even *avoided* those remedies which must have increased the mischief. But had the chronic inflammation of

membrana tympani been recognised by timely and suitable ocular inspection, perforation of the membrane, or in other words, an incurable morbid state, beyond the reach of any effort of art, might with the utmost certainty have been prevented: the patients had not then been the victims of their medical attendants' ignorance of that which is the first requisite for a skilful aurist.

From this conviction we ought not to allow ourselves to be shaken, by reading that Curtis (*h*), (whose inconceivable ignorance of what has been done in acoustic medicine, and whose gross quackery in the treatment of diseases of the ear I shall have abundant opportunities and necessity of exposing,) from 1817 to 1829 inclusive, has treated 8782 patients labouring under difficulty of hearing, at the London Dispensary for Diseases of the Ear, of whom he perfectly cured 3780, relieved 2497, and only dismissed 2505 without being relieved. This statement is devoid of any intrinsic claim to credence; and this is almost equally the case with the writings of Wright (*i*), the brilliant results of whose practice, it is evident are not to be depended on, if this one assertion merely be considered, that in diseases of the Eustachian tube and cavity of the tympanum, gargles are equally efficacious as injections. When, therefore, out of 1500 patients, Wright represents 496 as cured, 380 materially, and 290 partially relieved, whilst of the remainder, 210 were still under treatment or were lost sight of, and only 124 were dismissed as incurable, his statement must be allowed to rest on its own credibility, and we must wait for more accurate certain accounts. In opposition to these utterly incredible statements, I give a table in which 300 patients have been carefully arranged according to the morbid conditions under which they laboured, and placed under various heads, according to the therapeutical results that were observed. In the first class are arranged those patients whose condition, after a carefully instituted local investigation of the ear, admitted of no relief, not even the slightest, and who were, therefore,

(*h*) A clinical Report of the Roy. Dispens. for Dis. of the Ear, 1830.

(*i*) Plain Advice for all Classes of Deaf Persons, &c. 1826, p. 111.

not submitted to any treatment; to these succeed the cured, the relieved, and the uncured. Finally, I have shown the relation in which diseases of the external, middle, and internal ear stand to each other, with regard to their respective frequency, in which a remarkable preponderance of diseases of the auditory nerve will be observed.

TABULAR VIEW OF THE CURABILITY AND FREQUENCY OF DISEASES OF THE EAR.

NAME OF THE DISEASE.	Incurable and not treated.	Cured.	Relieved.	Uncured.	TOTAL.			
OF THE AURICLE.								
Erysipelatous Inflammation	..	1	..	..	1	3		
Scirrhous Degeneration	..	2	..	..	2			
Furuncle	..	..	..	..	..			
IN THE MEATUS EXTERNUS.								
Erysipelatous Inflammation	..	17	..	..	17	46	85	In the External Ear.
Inflammation of the Glandular Integument	3	9	13	..	25			
Inflammation of the Cellular Tissue	..	2	..	..	2			
Inflammation of the Periosteum	2	..	..	..	2			
OF THE MEMBRANA TYMPANI.								
Acute Inflammation	..	1	..	..	1	36		
Chronic Inflammation	11	7	17	..	35			
IN THE CAVITY OF THE TYMPANUM AND EUSTACHIAN TUBE.								
Inflammation of the Mucous Membrane, with Obstruction	..	28	6	..	34	55	55	In the Middle Ear.
Inflammation of the Mucous Membrane, with Stricture of the Eustachian Tube	16	..	3	..	19			
Inflammation of the Mucous Membrane, with Obliteration of the Eustachian Tube	1	..	..	..	1			
Inflammation of the Cellular Tissue of the Cavity of the Tympanum	..	..	..	1	1			
IN THE LABYRINTH.								
Erethitic Nervous Deafness	60	21	52	7	140	152	152	In the Internal Ear.
Torpid Nervous Deafness	3	8	1	..	12			
Deafness and Dumbness	8	..	..	..	8		8	
	104	96	92	8	300		300	
		188 Relieved						

PART II.

SPECIAL ACOUSTIC MEDICINE.

INTRODUCTORY REMARKS ON THE CLASSIFICATION OF DISEASES OF THE EAR.

WILDBERG (*a*), was the first to divide diseases of the organ of hearing into diseases of the ear, and those of hearing; in this respect, having the priority of Itard, who indeed by his extensive experience, remedied, as far as possible, the great imperfection of Wildberg's system, but still has not supplied those defects, which, for the most part, are completely inseparable from a system so opposed to nature.

The organ of hearing is provided for the sake of its function, the performance of which depends on the structure of the organ; so that neither of them can be separately diseased. A disease of the organ cannot occur without an accompanying lesion of its function, nor even without such a lesion as corresponds to its structure; nor, on the other hand, can functional lesion occur without disease of the organ; though it must be confessed that our means of investigation, especially in diseases of the auditory nerve, are not sufficient to point out the organic condition attendant on functional disturbance.

In studying diseases of the ear apart from those of hearing, the useless recurrence to the same diseases under both heads, is a far less evil than the difficulty which thence

(*a*) Versuch einer anatom. &c. Abhandlung über d. Gehörwerkzeuge des Menschen, 1795, pp. 250 and 282.

necessarily arises of obtaining a thorough and complete view of diseases so unnaturally severed.

When Itard (*b*) treats of deafness as produced by mucous or purulent otorrhœa, by suppuration or caries, or by polypous growths in the auditory canal, he finds himself obliged to refer to other parts of his work, to what he had said on the origin and treatment of these material diseases, to which it is likewise necessary to subjoin what he had to say respecting the disturbing influence of the same diseases on the function of hearing, and also how the condition the most essential to an improvement of the disturbed action of the sense is fulfilled, together with the cure of the organic morbid state.

Riedel and Vering, as regards the principle of their division, (which even separates diseases occurring in the external ear from those of the auditory apparatus, as if the auditory canal were not a part of the auditory apparatus,) have merely followed Wildberg and Itard. Beck had done better to have associated himself with these authors; for by his division into diseases of the plastic, irritable, and sensitive apparatus, he has produced the greatest confusion in the pathology of the ear. He even separates from the above diseases mechanical lesions, *e. g.* obstruction of the Eustachian tube from mucus, as though this canal were merely a dead pipe stopped with a plug.

Buchanan's (*c*) arrangement is not quite so bad, though his system is nearly as devoid of all practical utility as that of Beck; while Wright (*d*) and Curtis (*e*), freeing themselves from the annoyance of being shackled by any system, treat diseases of the ear in a manner so unconnected and so arbitrary, that we are deterred from the mere attempt to discover any order.

Deleau (*f*) has never again stated whether he still approves

(*b*) Traité, &c. ii. ch. 3, 4. i. chap. 2, 7.

(*c*) Guide to Acoustic Surgery. Hull, 1823.

(*d*) On the Varieties of Deafness and Diseases of the Ear, 1829, p. 56.

(*e*) Essay on the Deaf and Dumb.

(*f*) Tableau des Maladies qui engendrent la Surdité. Commercy, 1820.

of the classification which he published in 1820; as to its numerous repetitions, and the unnatural splitting of one and the same disease into several pretended independent diseases, it is more faulty than the system of Itard.

Saunders, Saissy, Jos. Frank, and others, according to the proposal of Du Verney, have endeavoured to effect a systematic arrangement, founded on the structure of the individual constituent parts of the organ of hearing, and thus have certainly entered on the only path which can conduct to the object in view. These attempts are, however, so incomplete, that their deficiencies are everywhere manifest, even in diseases of the external ear, where diseased products have most erroneously been taken as the ground of division; *e. g.* mucous and purulent discharges, polypi, &c., instead of endeavouring to establish the division according to the morbid alterations of the parts themselves which are affected. If this has been the case with the auditory canal, which is so readily accessible to ocular inspection, we cannot be surprised at the utter failure of the attempt to systematise the diseases of the internal and middle ear; for the ignorance of catheterism of the Eustachian tube, manifested by former writers, opened a wide door for hypothesis. To this observation Saissy is no exception; for he practised the catheterism too seldom, with too little dexterity, (and with still less judgment, as to the use to be made of the results obtained,) to allow of his being thus conducted to right views respecting diseases of the middle and internal ear.

In all the cases that have come under my care, it has been my endeavour, by a sedulous examination of the affected organ, to determine the seat of the disease, and the organic condition of the morbid symptoms, from a conviction that this is the only proper mode of arriving at a suitable and effectual plan of treatment. An extensive practice, for some years past, has brought under my notice the whole cycle of pathological alterations to which the ear is subject, and in so great variety that I may venture to attempt such

a systematic arrangement, that particular diseases shall follow each other in the same order as that in which the constituent parts of the ear that are morbidly affected are organically connected.

The general arrangement remains the same as in my first edition. Numerous subsequent observations have, however, rendered necessary a more accurate organic separation of the diseases of the meatus externus, and verified the independency of diseases of the membrana tympani. By the addition of diseases of the auricle, as well as of the acute forms of diseases of the ear in general, the whole work has been rendered more complete.

For the sake of greater practical utility, I have endeavoured to establish my views in the course of their development, by a selection of cases as varied as possible; though I may, again, be met with the semi-reproach, "that these cases are less remarkable for the rarity of their occurrence than for the elucidation they afford of the pathology and therapeutics of the subject discussed." Those histories of disease must always be the most welcome to the physician, the character of which is so clearly and distinctly stamped, that they can at once be recognised again in practice.

In diseases of the external and middle ear, inflammations with their sequelæ evidently act the principal part. In order to understand them better, the two are therefore not disjoined; the sequelæ, *e. g.* polypi, rupture of the membrana tympani, &c., are not represented as independent forms of disease, especially as they are always accompanied by chronic inflammation of the surrounding integuments. It is only in diseases of the internal ear, *i. e.* of the auditory nerve, that the inflammatory origin cannot be demonstrated, on which account we must restrict ourselves to the consideration of the purely functional derangements of this part, the existence of which is confirmed, not only by the favourable result of treatment founded on this view, but also by the occurrence of similar abnormal conditions of other nerves of sense.

CHAPTER I.

DISEASES OF THE EXTERNAL EAR.

These belong especially to the periods of childhood and youth, when the natural copious secretion of a thin, transparent, yellow cerumen denotes a greater flow of fluids to this part of the organ, and thus a greater disposition to diseases of growth. These are strikingly manifest in the various forms of inflammation, in alterations of the quantity and quality of the secretions, in boils, &c. The frequency of these is still further increased by the participation of the membranous external ear in all general cutaneous inflammatory excitements, the translation of which to the external ear frequently takes place in scarlatina, measles, small-pox, cow-pox, and in the various chronic diseases of the skin. More advanced age, it is true, is not exempt from the development of diseases of the external ear; but there is then so little disposition to them, that injurious causes of more powerful operation are required for their production. Most diseases of this kind which obtain in advanced life, date the period of their development from early youth, or childhood, from which time, they may accompany a man even to the end of his life, since of these nature, when unaided, is scarcely ever capable of freeing herself.

Section I.—Diseases of the Auricle.

The auricle has been strangely enough dealt with by different authors. Itard (*g*) denies that it has any use, any influence in improving the hearing, either in man or in animals, and states that the loss of it is quite immaterial to the function of hearing. In this opinion Vering (*h*) coincides, supporting it by reference to a communication made by Dr. Steinmetz (*i*), respecting a child, a year and a half

(*g*) Traité, i. p. 131. (*h*) Aphorismen, p. 6.
(*i*) Graefe und Walther, Journal, Bd. xix, 1. p. 118. 1833.

old, who had on the right side, instead of an auricle, three small elevations of thickened integument, slightly connected together; and on the left side, a single elevation of the same kind, which might be considered as a lobus, the meatus externi being, however, completely closed over by integument. In spite of all this, the child still heard perfectly well. This case, however, proves nothing, for in so young a child, delicacy of hearing cannot be proved with sufficient accuracy. Steinmetz, indeed, has said nothing whatever as to the means by which he had convinced himself of the child's acuteness of hearing. But, in this case, there is the less ground for depending on the soundness of the hearing, as both meatus, whose condition exerts so important an influence on hearing, were completely obliterated. Itard has not proved his position, and both he and Steinmetz are deceived by calling the hearing perfectly good, when only *complete* deafness does not exist, when there is merely a degree of dulness of hearing, which is compatible even with obliteration of the external meatus. While admitting that the auricle is not so important a constituent part of the organ of hearing, that the loss of it can or must be followed by complete deafness, I am convinced that a more or less perceptible diminution of hearing is the invariable result of such loss.

Buchanan (*j*) is directly opposed to Itard's view, and makes acute hearing so far dependent on the auricle, that he believes from its form and angle of attachment to the temporal bone, as well as from the form and depth of the concha, sufficiently certain prognostic data may be acquired, to allow of our determining on the curability or incurability of those cases of diminution of hearing, in which all other symptoms are too obscure for this purpose. If the concha be large and deep, the upper part of the helix overhanging, the scapha not protruding, the lobus directed diagonally forwards, and the auricle attached at an angle of between 25° and 45°, we have, according to Buchanan, the most

(*j*) Physiological Illustrations of the Organ of Hearing. p. 77, et seq.

favourable conditions, for collecting and conducting into the meatus the necessary number of sonorous vibrations for the production of acute hearing. Any deviations from these normal conditions of the auricle directly impair the acuteness of hearing; and, on the other hand, any removal of such deviations from the normal state, *e. g.* of the direction of the auricle, alleviates dulness of hearing.

The cases which Buchanan adduces as corroborative of his view, prove absolutely nothing. The first of these patients had accidentally slit through his auricle; by the aid, however, of a pad placed behind the ear, rapid union took place, and by this means the auricle was brought to an angle of 45° with the temple. After the cure, the patient is said to have heard better with the ear thus altered in its direction, than with the other ear, whose angle of attachment to the temporal bone amounted only to 10°. But without stating whether the patient had not, previously, always heard better with the ear which had been wounded, and farther, without having determined more accurately the difference between the two ears with respect to their powers of hearing, and without having instituted a careful examination of the whole organ, in order to remove any doubt as to the dependence of this difference on some other abnormal condition of the defective ear, the author cannot, I think, render this case of any value. In the second patient, whose ear was attached to the temple at an angle of 16°, this angle was increased to 45° by means of a pad, and in five minutes after this alteration of position, the author was rejoiced to find that the patient, who previously heard with great difficulty, could now hear almost anything that was said to him in a moderate tone of voice. This wondrous cure (!) was evidently to be attributed merely to the momentary improvement which any one, whose hearing is defective, can obtain by drawing forward the concha by means of the hand, rendered concave, so as to collect a greater number of sonorous vibrations.

The measurements made by Buchanan on a hundred living

individuals of the longitudinal and horizontal diameters of the auricle, the concha, and the meatus externus, and of the angle of insertion of the auricle, prove as little as the two cases just mentioned. He has, indeed, neither given us his standard for good hearing, nor examined with sufficient accuracy the ears of those whom he has denoted as dull of hearing, to be authorised in adducing the deviations from the normal conditions of the auricle, as a sufficient, or even as, in the least, an important cause of the existing diminution of hearing.

The truth lies in the medium between the two extremes; the auricle is not indispensable, nor is it altogether immaterial to good hearing. Lacerations, wounds, &c. of the auricle appertain to surgery. Wounds absolutely require to be united by suture, and this union must be maintained by adhesive plaster, or by the very appropriate pad recommended by Buchanan (*k*).

§ 1. *Erysipelatous Inflammation of the Auricle.*

This affection commences with a disagreeable painful sense of tension of the auricle, which from the lightest bright-red, assumes the deepest dark-brown-red colour, becomes hot, shining, and sensitive to the touch, hard, and swollen to such a degree, that the prominences and depressions forming the helix and antihelix can no longer be recognised. Not unfrequently, small transparent vesicles appear here and there on the swelling, filled with a clear fluid, which soon dries into a thin scab. Sometimes, there

(*k*) Buchanan's auricular pad is formed of cork, which is cut so as to correspond with a plaster cast of the space between the posterior part of the auricle and the cranium. Having cut the cork to the proper shape, it is to be brushed over with glue, and then rolled in fine cotton wool, and when the glue is well dried, the loose wool cut off. The pad is retained in its place by means of a bandage passed horizontally round the head. The superior part of the pad is attached to this bandage by a piece of tape, and its inferior part to two other pieces of tape, which are passed the one round the occiput, and the other under the chin, and tied on the opposite side.—(Tr.)

are numerous yellow purulent points, which after rupturing, desiccate, and form an adherent crust, with which the auricle is covered. The meatus almost always participates in the tumefaction, by which its diameter is materially diminished, and from the irritation of the secreting glands, there is induced a discharge of a thin dirty fluid, which is almost invariably followed by some diminution of hearing.

If the tumefaction be the result of erysipelas of the face, it gradually extends from one ear across the forehead to the other, where the morbid phenomena are most complete, when the ear first affected is already free from tumefaction, &c. The patient has always more or less fever, a loaded tongue, and other slight gastric complaints.

After these symptoms have lasted from three to four days, they gradually abate, the tension and redness diminish, the skin becomes wrinkled, desquamation takes place, the meatus again becomes free, and the morbid secretion and dulness of hearing vanish. Great sensitiveness of the ear to the touch, and to the action of the air, remain, however, for some days, after the other complaints. The present disease never gives rise to suppuration of deeper seated parts, even when frequent relapses occur; a broad thin crust is the only morbid product of this superficial inflammatory action.

This inflammation is the result of mechanical and chemical irritation of the auricle itself, or of the membrane lining the meatus, in the affections of which the auricle readily participates. Among irritations of this kind are to be classed sun-strokes; stings of irritating insects; irritation of galvanism or electricity; wounds; the introduction into the meatus of acrid, irritating fluids and salves, (*e. g.* tincture of castor,) and the extension of erysipelas of the face.

The inflammation thus excited is quite free from danger, but from the painful tension, and great proneness to relapse from the slightest cause, it is exceedingly annoying, especially if connected with frequent attacks of erysipelas of the face.

As regards the topical affection, the treatment must be

entirely negative; the ear may either be left uncovered, if the patient confine himself to his room, or be guarded by a light cap from the direct action of cold draughts of air. The accompanying febrile and gastric complaints are to be treated with emetics, &c., acccording to the rules of special therapeutics. Even the discharge of a thin secretion demands nothing more than careful ablution with warm water; the amount of secretion is seldom so great as to render syringing necessary. The swelling of the glandular integument of the meatus, &c. will be spoken of hereafter.

Case I. Schneider, a coachman, during great heat of the sun, on the 30th of June, was stung by an insect on the lobus of the left ear. On the following night, the left auricle was of a dark brown-red colour, and so swollen, that the prominences and depressions of the helix, &c. were scarcely recognisable. The tumefaction, which was dry, shining, tense, and extremely sensitive to the least touch, had extended, on the 1st of July, over the left cheek. The hearing had not suffered much, and there was but little tinnitus or fever. The loaded tongue and bitter taste, however, required an emetic, by which these complaints were removed.

On the 2nd of July, some transparent vesicles of the size of peas appeared on the helix and surrounding parts; a bloody discharge flowed from the meatus; and the spot which had been stung by the insect was denoted by a small black speck. There was a gentle singing in the ear, but still without any material diminution of hearing. The redness, tumefaction, and tension had already extended over the left half of the face, to the scalp, with constant fever and urgent thirst. A mixture of sal ammoniac with tartar emetic was ordered.

July 3rd, copious evacuations from the bowels relieved the febrile state, the tumefaction gradually extended across to the right side of the face, which it covered.

On the 4th, the whole face and head were implicated, together with the nape of the neck. The left eye was closed,

but the right remained free, From the left ear a bloody sanies was discharged, whilst the auricle had already become soft and free from pain. During the next two days, the eye, and especially the ear, of the right side were affected by the same complaints, which had proved so troublesome on the left side, where desquamation was in full progress.

On the 9th of July, desquamation commenced on the right ear, with which the redness, tumefaction, tension, tinnitus, dulness of hearing, and the discharge entirely disappeared.

§ 2. *Scirrhous Degeneration of the Auricle.*

Phenomena very similar to those which accompany erysipelatous inflammation, attend the commencement of this disease, though their progress is much more lingering. In the course of these symptoms there arises a swelling, of a bright red, or of a darkish red colour, accompanied with urgent burning, itching, tearing pain. The whole surface of the auricle is by degrees implicated, so that its eminences and depressions are occasionally so far defaced, that the ear presents merely a knotty, shapeless mass. There is no topical, circumscribed hardness to be felt, involving the deeper parts; the pain, also, is generally diffused equally over the whole swelling. On the red and swollen parts small vesicles appear, resembling various kinds of eruptions, which sometimes secrete a serous, and sometimes a thickish lymphatic fluid, which dries, and falls off under the form of fine bran, of thin scales, or even of a thick crust. When the chronic inflammatory process advances farther, it produces excoriation and ulceration of the auricle, which may thus be perforated and destroyed. In lepra (*l*) the external ear becomes at one part swollen and thick, whilst other parts of it, especially the lobus, are thin and wasted. When the disease is farther advanced, the ear is always more nodulated and misshapen, assuming (espe-

(*l*) Hensler vom abendländischen Aussatze, p. 137, 148.

cially if the lobus have disappeared) a round form. The nodules of the ear readily ulcerate. The urgent burning pain which accompanies this chronic inflammatory condition, often destroys the night's rest of the patient, but is seldom accompanied by febrile complaints, and even then only by those of a symptomatic character. For the most part, the meatus also suffers from similar inflammatory phenomena, when they have not commenced in this situation, which, however, is often the case, the inflammation spreading thence over the auricle. An important degree of dulness of hearing never fails to attend this state of things.

The seat of the present disease is in the corium. Its very tedious, lingering progress distinguishes it from the disease which has just been treated of, in which the inflammation is attended, from the first, with an even, polished tumefaction of the auricle. It is further distinguished from the following disease, partly by the very general extension of the tumefaction over the auricle; and partly by the disposition to pass into ichorous ulceration, which is not the case with the following disease; in which active suppuration of the cellular tissue takes its place.

The disease at present under consideration, belongs decidedly to the most chronic class; its development is for some time slow, but proceeds with certainty, as long as its cure is left to nature, which is here perfectly powerless.

Generally speaking, the extension to the auricle of chronic impetiginous, or leprous cutaneous affections, predisposes to scirrhous degeneration of this part, the progressive development of which is insured by want of cleanliness, constant scratching, the vascular nature of the part affected, and by bad and irritating food. The prognosis is very unfavourable; great obstinacy to treatment must be expected, as the disease is generally found already to have existed for some time, and has attacked a structure remarkable for its feeble vitality.

The treatment must, in the first place, be directed to the removal of the general cutaneous disease, which, perhaps,

may have occasioned the local affection of the ear, and even induced it during the process of the cure directed to the former. Sulphur baths and Zittmann's (*m*) decoction will here be found among the most efficacious means of cure.

In the topical treatment great cleanliness is necessary, and the surrounding parts should be guarded from the acrid serous or lymphatic secretion which is occasionally present. After having put the patient on a thin, spare diet, and established powerful derivation from the intestinal canal by means of smart purging, the next object to be accomplished, is to excite copious suppuration from below the mastoid process of the affected ear, by means of tartar emetic ointment, the beneficial influence of which in diminishing the heat, redness, and pain of the swelling is invariable. Simple zinc ointment is the best dressing for the excoriated and ulcerated spots of the auricle. I have never found it necessary to employ any other means; and least of all have I ever seen any advantage from Russian vapour baths; on the contrary, their violent action has generally been stated by the patients to have been decidedly injurious.

But if the structural alteration of the auricle be so great that its restoration to a healthy condition can no longer be expected, the degenerated portions may, without hesitation, be completely removed by the knife, taking care that the incision be made entirely through the sound parts. Artificial suppuration, kept up in the vicinity of the ear by means of tartar emetic ointment, and subsequently, an issue in the fore arm of the affected side, must be had recourse to, after the operation, in order to obviate the evil consequences which the sudden removal of such a degeneration of structure might induce.

Case II. "A countryman, when eight years of age, perceived an itching, which depended on a scabby eruption on

(*m*) Zittmann's decoction, as used at the Hôpital St. Louis in Paris, is a decoction of sarsaparilla and senna, with alum, calomel, and antimony. (Tr.)

the head. This extended to the right ear; and its irritation being increased by roughly rubbing it with the hand, the skin was corroded. A redness and swelling of the ear, the certain attendants of inflammation, continued from that time, much encouraged by the plethora and strength of the individual. The disease now remained stationary, for some years, but at the time of manhood, it broke out afresh, and with increased intensity. During his twentieth year it had acquired so enormous an extent, that the whole auricle was converted into a knotty, deformed, and lumpy mass, in which the natural projections could scarcely be detected. At the anterior and inferior extremity of the antihelix, the degenerated mass had begun to suppurate."

Dr. Fischer cut away with a knife the whole degenerated ear. The wound healed in less than six weeks. He does not, however, inform us of the influence which the disease and the operation may have exercised on the hearing of the right ear (*n*).

Case III. Eliza Schlatter, thirty years of age, had for some months, experienced a troublesome irritation in the right ear, which induced her to poke it with her finger, "in order to make the air enter," and had observed a light yellow fluid to be discharged from the ear, at the same time that an eruption appeared on the hairy scalp, attended by troublesome itching, and which gave rise to small moist scabs of the size of lentil seeds, and destroyed the roots of the hair.

The irritation of the scalp diminished by degrees, whilst that in the ear increased. The auricle became swollen, was hot and red, as was also the meatus, from which there issued an acrid, puriform, stinking fluid. The auricle was studded here and there with small pustules, which dried into a thin crust. Violent buzzing and tingling, and considerable difficulty of hearing took place, so that my watch was no longer heard.

Strong diet, purgatives, the sponge compress introduced

(*n*) Fischer vom Krebse des Ohrs, 1804.

daily, and a solution of sulphate of zinc, (gr. iv. ad ʒij. aquæ,) injected into the ear, removed, in the course of fourteen days, the discharge, tumefaction, redness, and heat of the auricle, and in some degree that of the meatus also, and at length even the tinnitus. The hearing, however, continued obtuse, and the tumefaction of the meatus near the membrana tympani, where the sponge compress could not reach, remained quite unaltered. This state of things continued only for a few days, when the meatus again swelled as before. Tartar emetic ointment was therefore rubbed in behind the ear, and a solution of acetate of lead injected. With this the tumefaction, secretion, and redness of the meatus permanently disappeared. The power of hearing in some measure improved (so that the watch could be heard at a distance of six inches), and there remained as consecutive incurable affections, complete opacity and slight thickening of the membrana tympani, with which the feebleness of hearing was closely connected.

Case IV. Mad. Bürchner, fifty-four years of age, in robust health, has suffered since the sixteenth year of her age (when she had the natural small pox) from difficulty of hearing, of the left ear at first, and afterwards of the right also, accompanied with susurrus tumefaction of the auricle and a puriform discharge from both ears. Russian vapour baths, aromatic fomentatious, drops consisting of eau de Cologne, cajeput oil, the springs of Warmbrunn, and the waters of Karlsbad, electricity, and many other remedies great and small, the patient had recourse to, in a confused way, one after the other, in the course of the year, during which time, the malady had become considerably worse.

I found both ears extremely red, swollen, and covered with dry scales, interspersed with suppurating, corroding pustules which extended over the adjacent integuments. The meatus, which were of the same very red colour, were swollen so as to admit only of the introduction of a very small crow-quill, and they secreted a thick greenish yellow

fluid. The patient, at this time, complained of a continued roaring noise, resembling a loud waterfall, which disturbed her night's rest. The hearing was so obtuse, that she scarcely heard my watch when placed close on her ear.

The patient was in the first place put on a very spare diet, well purged with aloetic medicines, and the sponge compress was introduced into the ears, which however, excited great pain and hæmorrhage. It was not till the meatus had been cauterised with the nitrate of silver, for four weeks, and the sponge compress smeared with ung. zinci, that the tumefaction of the ears, external as well as internal, disappeared, the discharge diminished, and the eruption vanished, so that the caustic could be left off. The sponge compress smeared with the ointment, the diet, and the purgatives, were, however, continued for some time longer. Two months afterwards, all the morbid phenomena had vanished, excepting slight tinnitus and great difficulty of hearing, the continuance of which depended on considerable destruction of the membrana tympani, which after the dilatation of the meatus, could be distinctly recognised as an incurable affection.

§ 3. *Furuncle of the Auricle.*

Preceded by pain of a sharp, pricking, throbbing, and tearing character, and increased heat, there is formed on a circumscribed spot of the auricle, a red, hard tumour, from the size of a pea to that of a hazle-nut. When the tumour is small, the surrounding parts are healthy in appearance, but when larger, the redness, tension, and swelling extend beyond the focus of the disease, accompanied by febrile symptoms and sleepless nights. This species of inflammation occurs most frequently in the concha, just before the entrance of the meatus, in the scapha, and in the cavitas innominata, in those parts of the auricle, which is throughout but sparingly supplied with cellular membrane, where there is the least of this tissue. After the swelling thus described has lasted for several days, or even for several weeks, without any

change, it is felt to fluctuate if the tumour has acquired a large size; but if the swelling be smaller, it presents merely a soft yellow point, from which pus escapes, mixed with some streaks of blood, the opening being effected either naturally or by the lancet. This discharge is followed by immediate relief, and soon after, by the disappearance of all the complaints; a shrivelled, knotty eminence, in the situation of the tumour, remaining for some months after, when there has been much swelling. The less the extent of the inflammatory swelling, the less does the hearing suffer; but the more in proportion as the swelling obstructs the meatus. The seat of the present disease is manifestly in the cellular tissue beneath the dermis, where the formation of pus invariably takes place, by which, as well as by its whole progress, the disease is distinguished from the two other inflammatory affections of the auricle.

The precise causes of this affection have not as yet been discovered. Dr. Bird (*o*) thinks he has observed it to be especially frequent in those who are the subjects of mental derangement, but this probably depended on some fortuitous coincidence of unknown circumstances. In the obscurity which exists as to its mode of origin, one is much inclined to attribute it altogether to the application of cold.

The prognosis is invariably most favourable. No inconveniences result from the duration of the disease; it is merely productive of considerable annoyance till the pus is discharged. On this account, therefore, as well as because no other termination is to be looked for, our chief object is to accelerate the formation of pus. This is accomplished by means of emollient poultices, applied till the hard swelling becomes perceptibly soft. If no opening take place spontaneously, the pus should be evacuated by puncture, or, when the swelling is more extensive, by an incision. Mild purgatives alleviate the febrile symptoms which may have attended the formation of pus, without its being necessary, in general, to have recourse to more important means.

(*o*) Graefe u. Walther, Journal, Bd. xix. 4, p. 631—638.

Sect. II.—Diseases of the Meatus Externus.

The meatus externus is an oval-shaped canal, to the formation of which contribute not only integument and cartilage, but also a process of the temporal bone. It is situated between the articular process of the lower jaw, and the mastoid process; commences beneath the border of the ear at the anterior edge of the concha, and extends from an inch and a quarter, to an inch and a half in length. At its commencement it is directed somewhat forwards, then upwards and backwards, and lastly, again downwards and forwards to the membrana tympani, where it terminates, and is completely separated by this membrane from the cavity of the tympanum. The inferior wall of the auditory canal is from one to two lines longer than the upper. It is covered externally by epidermis, which gradually becomes thinner as it approaches the membrana tympani, which it also invests with a very delicate layer. Beneath the epidermis lies the glandular integument, a process of the dermis, in which are imbedded, close to the entrance of the meatus, the bulbs of close, short hairs; but as this tissue approaches to within a line or a line and a half of the membrana tympani, these capillary bulbs are replaced by a vast number of simple glands, in which the cerumen of the ear is secreted, and whence it is poured out by simple fine excretory ducts on the surface of the meatus. Buchanan (*p*) estimates the number of these glands at from one to two thousand, the majority of which are situated in the middle and superior surface of the meatus.

The glandular integument is attached to the cartilage and bone beneath, by means of rather dense, thin cellular tissue, in which there is never any accumulation of fat.

In consequence of the curvature of the meatus, its extremity, as well as the membrana tympani, are so situated, that, when the canal is of its usual width, they can be distinctly seen only when the light of the sun falls directly on them.

(*p*) Physiological Illustrations, &c. p. 18.

In order to obtain such a view, it is necessary to direct the auricle towards the sun, and pull it well upwards and outwards, to draw the tragus outwards and on one side, and to incline the head of the patient strongly to the opposite side, and thus expose the canal to the bright sunshine. By this means the object is attained, when the auditory passage and membrana tympani are sound. But whenever morbid changes have taken place in these parts, a particular instrument is required, in order to obviate the curvature of the meatus, and convert it into a straight canal, so that the sun's rays, or the artificial light of a lamp, may penetrate to the extremity.

Fabricius Hildanus (*q*) was the first who invented such an instrument, to which he gave the name of a speculum auris; but the arms of his instrument, from their pyramidal form, are unfavourable to its introduction into the meatus. Of this instrument, so indispensable to the aurist, no mention appears, since the time of Hildanus, not even by Itard, Saissy, and Deleau. Jos. Frank (*r*), however, speaks of an ear-speculum, without describing it. Wright (*s*) rejected, as inapplicable in practice, the use of the instrument, which appears to be known and used in England, and which has three arms (*t*). But he praises an instrument of this kind of his own, though he nowhere describes it. I have seen specula, the farther extremity of which, that was to be introduced into the ear, had an oval form, altogether inappropriate; and others, the arms of which were opened by a screw, in a manner as slow as it was preventive of the freedom of motion requisite in such cases.

My speculum, the utility of which has been proved in

(*q*) Opera Omnia.

(*r*) Prax. Med. univ. Præcepta, &c. ii. vol. i. sect. 2 b., p. 886.

(*s*) On the Varieties of Deafness, p. 35, et seq.

(*t*) The speculum most commonly used in London is that of Itard. This has only two arms, that are opened by a pair of forceps-handles, and differs from that of Dr. Kramer merely in the shape of the opening at the farther extremity, which is oval, and in not possessing the same wide, funnel-shaped orifice. (Tr).

innumerable instances, is a metallic funnel, one inch five lines long, divided longitudinally into two arms. The farther extremity is of an almost cylindrical form, one line in diameter and seven lines in length; so that it can be introduced with ease, even into an unusually narrow meatus. Both halves of the funnel are united by their superior border, at right angles with two forceps-handles fastened by a joint; pressing on these handles opens the funnel, the wide separation of which gives much more commodious space for the sun's rays, for the eye, and for the instruments of the aurist, than the speculum of Hildanus. (Vid. fig. 1.) The inner surface of the funnel should be painted, or rendered perfectly dull: a polished surface reflects the incident luminous rays, and materially interferes with the examination.

In order to conduct this examination, the patient is placed on a stool, near the window, with the affected ear directed towards the window, through which the sun should be shining brightly; the auricle is drawn strongly up with the left hand, and the patient allowed to hold open his mouth, in order to free the auditory passage from the pressure of the articulation of the lower jaw; the speculum is introduced, with its cylindrical extremity closed, as far into the meatus as its width or sensibility will admit of, or as far as is required for the purpose of investigation. The hand being pressed on the handle of the instrument, it opens directly with the utmost ease, as far as is necessary, or as far as the meatus allows of being dilated. The practitioner can thus by a proper inclination of the head of the patient, direct the rays of the sun to the bottom of the meatus, and obtain sufficient room to discover any diseased condition of the meatus and membrana tympani which may exist,—provided he does not obstruct the light of the sun by his own head!

No artificial illumination can equal the light of the sun's rays, or render this light unnecessary, on which account it must always be had recourse to in important cases, *e. g.* in operations in the vicinity of the membrana tympani. In

spite of all the unsuccessful attempts to find a substitute for the light of the sun's rays, not always at our disposal, these attempts have been continually renewed, and have so far succeeded as to enable us to examine with success the more easily recognisable forms of disease.

Cleland (*u*) was the first who recommended for this purpose a convex glass, three inches in diameter, and fixed in a handle, which was held before a wax-light; a rude instrument, quite inapplicable to practice.

Bozzini continued to rely on the wax-light, as the means of illuminination, but attempted to increase its power by placing behind it a concave mirror; without, however, accomplishing his object. He was prevented from availing himself of the idea of substituting an Argand lamp for the wax light, fearing that it might occupy too much room, and require a perfectly horizontal position.

Deleau subsequently recommended an apparatus, which consists of a wax-light placed between two concave mirrors; but this also is inefficacious, for the light is too feeble.

Buchanan (*v*) committed the same error; for, as but few and feeble rays of light are thrown on the concave mirror from a wax-light, much light cannot be reflected from the mirror, and equally little concentrated by the two double convex glasses of his apparatus. In order to obviate the above objections as far as possible, I have constructed the following apparatus (*vide* fig. 2.) The principal part is an Argand lamp, with a thick cylindrical wick, the reservoir of oil being placed behind the box next to be described. This box is constructed of tin plate, the inner surface of which is painted black in order to prevent any reflection of the light. It covers the lamp so as completely to enclose the flame; the lamp glass passing through an opening in the top. At a convenient distance from the flame, and behind it, against the inside of the back of the box, there is

(*u*) Philos. Trans. vol. xli. part ii. p. 848.
(*v*) Illustrations, &c. 1825.

a plated concave mirror. In the anterior face of the box there is inserted a tin tube, fourteen inches in length, which is likewise blackened inside; and each extremity of which is provided with a double convex lens, two inches and a half in diameter.

The Argand lamp throws its powerful mass of light against the concave mirror, whence the rays are reflected through the first convex lens, along the tube, and through the second convex lens. The luminous rays are thus collected into an intensely bright focus, of the size of a shilling, at a distance from the tube of the apparatus very convenient for the illumination of the auditory passage.

But whether we choose to employ the light of the sun, or artificial light, in the examination of the auditory passage, recourse must always be had to the speculum in important cases, especially in order to be able to effect the examination by means of the eye alone; and not as Curtis, Itard, Wright, and others, to be obliged to make use of a probe; partly because no accurate diagnosis is obtained by this means, and partly because, from the great delicacy and sensibility of the membrana tympani, great injury may thus be done, and, at least, unnecessary pain must be given to the patient.

Buchanan (*w*), who has exaggerated the importance of the auricle to good hearing, succeeds no better as regards the meatus and its structure, where he has created conditions to which he has most arbitrarily attributed an important influence on hearing. Thus, he names the inferior surface of the meatus, the "depressional curve;" and considers it especially necessary, from the great width of the osseous portion of the meatus, to prevent confusion of the sonorous undulations. He gives the name of "ceruminous tubular circle" to the natural envelopment of the meatus with cerumen, which, by narrowing the passage, is to concentrate the undulations of sound; soften their asperities by its chemical qualities,

(*w*) Physiological Illustrations, &c. p. 5, et seq.

and render them melodious, &c. According to Buchanan, if the secretion of ear-wax be defective, the sonorous undulations enter the meatus in an irregular manner, each one is reflected by the dry walls at a particular angle, and so forth, thus producing confusion in the perception of sounds. He therefore thinks (*x*), that a perfect secretion of wax, in the form of the ceruminous tubular circle, is a certain sign of the soundness of the whole organ.

To this last principle all experience is decidedly opposed. A perfectly healthy secretion of ear-wax is very often attendant on important diseases of the middle or internal ear, which are exceedingly prejudicial to hearing. The views advanced respecting the "depressional curve" and the use of the "ceruminous tubular circle" are idle theories, as little demanding confirmation as refutation. My experience has not confirmed the advantage which Buchanan boasts is to be derived from his very compound mixture of ointments, as a substitute for the defective tubular ceruminous circle (*y*); though I have made use of it in numerous instances, and in cases to which it was well adapted. Martin Coates (*z*) is certainly equally mistaken in his opinion that deafness may depend on an arid state of the auditory passage alone, (dry ears,) and that it may be cured by the introduction of ointments into the ear, and by the internal administration of such remedies as calomel. Deviations in the quantity and quality of the cerumen are generally unimportant attendants on other diseases of the ear, but very seldom exist independently, and then exert no important influence on the function of the organ.

Diseases of the external meatus fall also under the class of inflammatory diseases; though they very seldom assume an acute, but almost always a chronic form; which form they very readily pass into, even when at their onset they are acute. As the auditory canal is especially active in

(*x*) Physiological Illustrations, &c. p. 70.
(*y*) Idem. p. 47, et seq.
(*z*) Medical Gazette, February, 1834.

childhood and youth as a secretory organ, but, as with advancing age, the supply of fluids to this part gradually diminishes, the diseases to which it is subject are of necessity especially frequent in childhood and youth; whilst manhood and old age are particularly subject to diseases of the middle and internal ear.

Du Verney (*a*) divides diseases of the external meatus, into 1. Otalgia (from acrid wax, and from acrid and saline humours secreted by the glands of the auditory passage). 2. Inflammation, with abscess and ulceration. 3. Obstruction (consequent on abscess and ulceration, from foreign bodies, inspissated wax, &c.,)—a division, which is devoid of any guiding principle. The following division, given by Itard (*b*), is equally confused. Chap. i. External catarrhal and purulent Otitis.—Chap. ii. Mucous and purulent Otorrhœa (both merely affections consequent on the first).—Chap. iii. Otalgia.—Chap. iv. Worms and Insects in the Ear.—Chap. v. Congenital Occlusion and Narrowing of the Auditory Canal.—Chap. vi. Accidental Obliteration and Contraction of the Auditory Canal.—Chap. vii. Polypi of the Auditory Canal.—Chap. viii. Ceruminous Engorgement of Ditto; (the last three chapters come under the class of products of external catarrhal otitis, or at least are directly connected with it).—Chap. ix. Foreign Bodies in the Meatus (these belong to the etiology of external otitis).

Saissy omits all mention of diseases of the external ear. Deleau (*c*) has attempted a most unpractical division, which merits rather the name of a distribution, for he makes a separate disease of each separate symptom; *e. g.* No. 8. Narrowing of the Auditory Canal. 19. Dartres of the Auditory Canal. 20. Inflammation of Ditto, without Discharge. 21. The Same, with Discharge. 38. Thickening of the Parietes of the Auditory Canal.

Saunders (*d*) very briefly states, without any symptoma-

(*a*) Traité de l'Organe de l'Ouïe, p. 115, et seq.

(*b*) Traité, &c. t. i. p. 337.

(*c*) Tableau des Maladies qui engendrent la Surdité.

(*d*) The Anatomy, &c. p. 43.

tology, that inflammation, caries, and polypi may take place in the auditory passage. Wright and Curtis make no attempt at a systematic division, and Buchanan (*e*) has completely failed. Of Beck I have already spoken; but Vering has still more recently thrown together, without any order, every affection connected with this part.

Careful observation has taught me that all diseases of the auditory passage depend on inflammation of its organic constituent parts, which have a characteristic imprint, according as one or other of these organic parts is attacked. Diseases consequent on these forms of inflammation have no claim to be considered as independent diseases, but are naturally classed according to their origin. They are thus, then, essentially divided into

§ 1. *Erysipelatous Inflammation of the Meatus Externus.*

Accompanied by more or less urgent tickling, itching, pricking, and burning in the meatus, and with tearing, dragging pain about the ear, and in the head; with confusion of the head; with various kinds of noises in the ear, and various degrees of impaired hearing; a superficial redness of the auditory canal is developed, without swelling or diminution of its calibre. In the course of two or three days, broad dry cuticular scales are thrown off, and as a result of the sympathetic irritation of the glandular structure, an increased secretion of a very tenacious cerumen takes place, of a bright brown, or dark brown colour, mixed up with the cuticular scales, and firmly adherent to the walls of the meatus, which is thus completely stopped up.

If the accumulation be moderate, and the matter secreted not altered in quality, not tenacious, and if the secretion soon cease, the cerumen dries, and either falls out in small portions, and frees the patient from all his complaints, or it

(*e*) Guide to Acoustic Surgery.

becomes detached here and there from the walls of the canal, to such an extent that sound can again in some measure reach the membrana tympani. In both cases the patient derives great relief.

But if the cerumen be much altered in quality, its irritating nature augments afresh the secretion and accumulation in the auditory passage, which, however, never passes into a muco-purulent discharge; so that I am disposed to consider as an exception to the rule, the single instance in which I have found ulceration of the parietes of the auditory canal, underneath the cerumen. It is more common, after the removal of the accumulation, for redness of the membrana tympani to be observed; but this soon disappears spontaneously, and it is probably the result of the acrid irritating action of the cerumen on the delicate tympanic membrane. In more advanced age, however, if the cerumen has remained for years in the meatus, it assumes the form of a brittle concretion, resembling chalkstone, the removal of which is always exceedingly troublesome and painful. In the present disease, the auditory canal is, generally speaking, very sensitive to the least touch, and bleeds readily; the patient feels his ear full and stopped up; it seems as though there were a veil drawn before it. This sensibility exists even when the patient takes no notice of the above mentioned slight symptoms of inflammatory irritation of the auditory canal, which a person in other respects in good health, who is not accustomed to allow his attention to be drawn to slight complaints, is not easily induced to regard.

The disease usually developes itself suddenly, and by observant persons is associated with some particular noxious cause, such as cold, or imprudent bathing. In other cases the disease appears to be gradually established; for particular symptoms, or the whole of them, evidently increase in the course of a shorter or longer period of time, this increase being either uninterrupted, or subject to appreciable remissions; the alleviation experienced giving place to an

equally decided aggravation. The accumulation occurs as frequently in one ear as in both.

The diagnosis should never be determined by the patient's account of the symptoms, (*i. e.* by subjective symptoms,) but always by ocular inspection, and by this means it is so easy, that one cannot but lament the negligence with which it is treated both by physicians and surgeons. The patients, however, are still more to be pitied, when their disease, so easily curable, remains unrelieved from want of attention on the part of the practitioner who has charge of them, while the origin of the evil is sought for in the abdomen or any where else, and thus maltreated rather than treated with the most useless remedies. Even within the last few years, the following case came under my observation. Counsellor B———wiz had suffered, for four years, in consequence of too cold affusion of the head, from weight and difficulty of hearing, especially in the right ear, with tinnitus and confusion of the head. During this period of time, he had not only made use of blisters, baths, and medicines taken internally, but had also resorted to Toeplitz and Warmbrunn, and even gone through a course of homœopathic treatment, without having derived the slightest benefit: during all this time, the affected ear had never once been examined. I discovered in both ears a quantity of viscid ear-wax, which was removed by injections of simple warm water, and thus, in the course of half an hour, he was freed from all his complaints, which had lasted many years.

In most cases, it is necessary, only to draw the auricle upwards and backwards, and to expose the meatus to the sun, or even merely to the window, in order at once to perceive the dark brown shining mass which obstructs the ear. If it be more deeply situated, it is readily brought into view by making the examination with the aid of the speculum.

This accumulation of ear-wax has very unjustly been attributed to neglect and want of cleanliness on the part of the patient; it is a morbid product, the removal of which no patient can effect; for the auditory passage, naturally

very sensitive, is rendered much more so by the erysipelatous inflammation, and even at its anterior part will not endure the slightest touch.

It is equally erroneous to suppose that the cerumen becomes entangled with the fine hairs of the auditory passage, without any antecedent disease of the meatus; that it is thus prevented from obtaining free exit; that the inflammatory phenomena are the secondary effects of the degenerated wax; and that therefore the accumulation occurs most frequently in old people. Experience teaches us the very reverse: in old people, whose meatus is beset with thick strong hairs, a deficiency in the secretion of cerumen is much more frequently observed. Besides, the accumulation takes place chiefly at the bottom of the canal, at whose entrance exclusively hairs are met with, and these are much more rarely found mixed up with the viscid ear-wax, than are cuticular scales from the meatus. But, finally, all objections are rendered null by the fact, that accumulations of ear-wax are not only frequent in children, but occur suddenly in the course of a few days, and after the application of cold, with evidence so marked of irritation of the auditory canal, that no possible doubt can be entertained as to the justice of attributing their origin to inflammation of the epidermis. (Oberhaut.) Cold, as I have before stated, is the chief cause of this erysipelatous inflammation, a second attack of which, after recovering from the first, is, however, more rare than might at first be supposed.

The prognosis is always highly favourable, when an attentive practitioner has charge of the patient, who then has the gratification of finding his hearing, which may have been enfeebled for many years, suddenly restored. The possibility of nervous deafness being associated with this accumulation of viscid cerumen, must be kept in view, in which case the removal of the accumulated mass often exerts not the least beneficial influence on the dulness of hearing, the tinnitus, &c.; since the deeper situated affection of the auditory nerve remains unaltered in intensity.

The treatment of this disease, exceedingly simple and certain, has been rendered most unnecessarily difficult.

Lentin (*f*) recommends the patient's head to be laid on a table, the meatus to be filled with a lukewarm fluid, the pipe of the charged syringe to be immersed in this fluid, and then the injection to be made. This mode of procedure, it is said, is agreeable to the patient, and places the membrana tympani and the ossicula auditûs in a favourable position.

As an injection in cases of hardened ear-wax, he employs ℥iij. of infusion of herba mercurialis or saponaria, with ʒj. of calf's gall, and fifteen or twenty drops of lac ammoniaci.

Buchanan (*g*) merely advises the use of a syringe, with a strong pipe two inches long, and seven-eighths of a line in diameter at the mouth, and which must not hold more than ʒiij. of fluid, lest with a larger quantity of water, too great violence should be done to the ear. The thumb and index finger of the left hand are to be applied to the middle of the syringe, and the other fingers farther forward: an assistant is to lay hold of the chin of the patient with one hand, and draw the head on one side, whilst with the other hand, he draws up the auricle. The operator is to stand on the side of the patient, and applying the back of the left hand, in which the syringe is held, against the angle of the patient's lower jaw, the tube of the syringe is to be introduced to the depth of half an inch into the auditory passage, directed against its superior surface, and the injection is then to be accomplished with the right hand. He has very beautifully endeavoured to represent by plates, how a thick syringe pipe fills up the auditory canal, and prevents the water injected from again flowing out.

All idle dreams! The water flows out again very well, in spite of the thick pipe, and carries along with it the loosened wax. No stream of water from a large ear-syringe can injure the membrana tympani, especially as one does not inject against the membrana tympani, but against the hardened

(*f*) Beiträge z. ausüb. Arzneiwiss. iv. 135.
(*g*) Illustrations, &c. p. 19.

wax. The small syringes, generally employed for this purpose, are therefore useless, as they hold too little water, prolong the operation interminably, and from the length of their tube, are liable to be pushed too deep into the meatus of restless patients, and thus occasion unnecessary pain, and even really injure the membrana tympani.

I therefore use an ear-syringe, three inches in length, holding an ounce and a half of water, furnished with a pipe three quarters of an inch long, with an opening sufficiently large to allow of a powerful stream of water. The end of the tube nearest the body of the syringe, is furnished either with a broad shield or two strong rings, to afford points of support for the index and middle fingers of the right hand, when the piston is pushed down with the thumb of the same hand. By this means the left hand remains at liberty, to draw the auricle of the patient upwards and backwards, so that the injection can be effected without the aid of an assistant, as there is no fear of passing the short pipe of the syringe too deeply into the meatus.

For the sake of cleanliness, the patient should sit or stand with a wash-hand bason before him, holding his head over it, so that the water thrown into the ear may fall into the vessel. It is very seldom necessary to soften the indurated wax, previously to the injection, by dropping in oil of sweet almonds; simple lukewarm water answers the same purpose perfectly well, though it should be necessary to throw in some additional syringes-full. Any other fluid than lukewarm water is quite superfluous; I have never met with an instance in which the indurated wax was not washed out by it in half an hour. Immediately after syringing out the ear, all the symptoms disappear, the patient feels his head light, and the tinnitus and the diminution of hearing are removed, as by a charm. But the auditory passage should, notwithstanding, be carefully investigated with the speculum. If the walls of the meatus are found much reddened, a solution, containing one grain of acetate of lead to an ounce of water, dropped into the ear, is the

most useful application, and its action is powerfully aided, in obstinate cases, by rubbing in tartar emetic ointment behind the affected ear. The redness then invariably vanishes in a few days. Should there be any evidence of ulceration of the meatus, it merely requires to be smeared with tincture of myrrh, or tincture of opium, &c., in order to effect its cure.

The cases which are annexed, for the elucidation of this form of disease, may appear far too numerous; but my object was to show, by this means, how frequently, to the great injury of the patient, local inspection of the affected ear has been neglected; though every physician and surgeon must be familiar with such cases; and farther, to show that cases of apparently even severe deafness, may depend on a disease so easily removed. It is certainly a disgrace that patients should go about, for years, with a plug of hardened wax in their ears, and be even declared incurable, because people prefer amusing themselves with theoretical speculative notions, rather than see with their eyes what, in a measure, is exposed to view.

Case V. Gustavus P——, æt. four years, complained of an obstruction of the left ear, which occasionally became free, but did not continue so; the right ear appeared to be sound. Even in this ear, however, I found a brown plug of wax, rather loosely attached, and the hearing distance was only six feet. In the left ear, on the other hand, there was a firmly adherent dark brown mass, and the watch could be heard only at a distance of one foot. Both ears were easily and thoroughly syringed out, and sound hearing was again restored.

Case VI. Von B——chitsch, æt. twelve years, lively and healthy, complained of an annoying sense of fulness in the left ear. The hearing distance was four feet. His complaints depended on an adherent mass of a bright yellow colour, which plugged up the meatus. The right ear

remained sound. A few injections with warm water restored to the left ear its healthy feeling and power of hearing.

Case VII. Giese, a schoolmaster, twenty years of age, in vigorous health, exposed himself to cold, three weeks ago, after a bath. Since that period, he has complained of singing in the right ear, and of deafness in both together, so that he could scarcely hear my watch at the distance of two inches, and was quite unable to attend to his duty. Both ears were found to be stopped with dark dirty-brown ear-wax. Simple aqueous injections, during fifteen minutes, washed out these accumulations, and in this short space of time, entirely restored the patient's hearing; the returning sound having no unpleasant effect upon the ear.

Case VIII. Mr. Franke, aged thirty-one years, three years before I saw him, became violently chilled; immediately after which, there occurred acute singing in the right ear, with considerable difficulty of hearing, numbness and dragging in the right half of the head, which still continued, so that a watch could be heard only at a distance of one inch. The left ear was quite healthy. A large quantity of dark, tough cerumen was found in the right ear; below it, the meatus was of a deep red colour, the handle of the malleolus, in particular, shining through, of a blood-red colour. When the injection had washed out all the cerumen, every complaint instantaneously disappeared; the hearing immediately resumed its customary acuteness. The slight inflammatory symptoms disappeared spontaneously in a few days.

Case IX. Schrœder, a master rope-maker, from Landsberg, forty-nine years of age, has suffered for many years from rheumatic pains in the side and hips, from loud and constant singing in the left ear, from which the right is sometimes free. The hearing distance of the right ear was three

inches; of the left, one line. Blisters applied behind the ear appear to have increased the deafness, which was regarded as an incurable rheumatic affection of the ears. I immediately discovered that the ears were blocked up by dark brown cerumen, the removal of which, by warm water injections, put an end, in half an hour, to singing in the ears and difficulty of hearing, which had existed nearly ten years. The hearing distance with both ears was now thirty feet.

Case X. Count Von Dembiczky, fifty-two years of age, has from time to time, during some years, noticed a slight singing in the ears, without remarkable difficulty of hearing, which, however, increased considerably, when, on account of other complaints, he went to Norderney for sea-bathing. The singing in the ears here became so violent as to resemble the blowing of a strong wind, with frequent crackling and snapping alternately in the ears. Without any local examination being instituted, the disease was regarded as hæmorrhoidal. Leeches were applied to the anus with the best effect, as far as it regarded the hæmorrhoidal flux, and behind the ears; eau de Cologne and cajeput oil were also poured into them, but without producing any effect upon the disease of hearing. A local examination explained every thing. Both ears were quite full of cerumen. My watch was audible by the left ear at the distance of one line, by the right at a distance of six inches. The obstruction was removed, in about half an hour, by warm water injections; and together with it, the singing in the ears and difficulty of hearing. The head was free from all confusion. The patient was restored.

Case XI. The Countess V. Dankelmann of late years has frequently suffered from deafness and singing in the ears. She has heard better, when travelling, than when all was still around her. These complaints have disappeared, at intervals of longer or shorter duration, without any medical inter-

ference, and entirely of their own accord. Their disappearance has always been attended with a sensation of something being drawn away from the ears, and this occurring so suddenly that she was obliged to keep the ears covered to protect them from the very violent and painful impression of the unusually loud sound. In 1832 this complaint had again lasted several months. It had commenced with low singing in the ears, which however soon increased, with so remarkable confusion in the head, that *e. g.* letter-writing became a very burthensome exertion. A loud sound was in the highest degree disagreeable to the patient. Considerable itching and pricking frequently occurred in each meatus. Various external and internal remedies, and even the endeavours of Dr. Stüler, a homœopathist, were put in requisition against this apparently remarkable disease of the ears, but in vain. No one had taken the trouble to examine the ears.

I found, without much trouble, that both ears were completely stopped up by cerumen. The removal of which with an ear-pick, on account of the great sensibility of the meatus, could not be thoroughly accomplished. Warm water injections effected it perfectly; and the consequence was, that all confusion of intellect, singing in the ears, and difficulty of hearing disappeared quickly, permanently, and entirely. A slight relapse, which occurred a year afterwards, was as completely relieved at one sitting, and the patient has, as yet (1836), had no return of the affection.

Case XII. Mr. Von Grunenthal has for some years, without being able to ascribe it to any particular cause, been almost unable to hear with the left ear, in the meatus of which I discovered a plug of dark brown cerumen. After this was washed out by aqueous injections, sound hearing instantaneously returned, although, at the bottom of the meatus, near the membrana tympani, there was a superficial ulcer, about two lines in breadth. In a few days, by touching this with tinctura opii crocata et myrrhæ, it was healed;

and thus a disease of the ears, of several years standing, was as quickly as it was completely cured.

§ 2. *Inflammation of the Glandular Structure of the Meatus.* (*Catarrhal Inflammation.*)

The patient experiences, more or less, troublesome itching in the ear, with an irresistible impulse to thrust the finger into it, in order, as many express themselves, to make the air enter. This irritation passes into severe, burning, tearing pain, which is much increased by any motion of the jaws, as in eating, speaking, &c.; disturbs the night's rest, and extends over the whole ear, to the mastoid process and the parotid gland; but still is never so severe as to produce more than slight fever towards evening, and even this but seldom. Children scratch behind the ear, scream out in the midst of their sports, and if they are able to speak, complain distinctly of their ear. The auditory canal is swollen, either towards the bottom only, or as far as its entrance, diminished in calibre, and hot, without, however, being always red. The tumefaction and redness (when present) extend over the auricle, either involving the whole or a portion of it, which is then beset with vesicles, or even with pustules, is hot and tender.

The tumefaction of the meatus is sometimes of a pale, and sometimes of a deep red colour, and so great that it will scarcely admit of the introduction of a knitting needle. This tumefaction is either spongy, consisting of vesicular eminences closely set together, or of distinct pustules, containing a lymphatic or purulent fluid: or it is firm, uniform, and even. In other cases again, it attacks only one side of the meatus, forms a kind of elevation, which irregularly traverses the cavity, and covers the membrana tympani, and this, as long as it is completely or partially visible in inflammation of the glandular structure, manifests the same swelling and redness as that with which the meatus is affected.

One or more days after the commencement of the painful sensations, there is seen at the entrance of the meatus a serous or muco-purulent fluid; sometimes of a mild character, at other times, acrid and corrosive; scanty, or abundant in quantity; of a green or yellow colour; streaked with blood, dirty, or whitish; of a sweet or very disagreeable ammoniacal odour. From this, however, we cannot conclude that caries exists. Noises in the ears, of the most varied kinds, though not necessarily present, even in the severest cases, are yet associated with most cases; being sometimes deep-toned and sometimes shrill, but never by any means an essential symptom. It is different, however, with the dulness of hearing, which always accompanies inflammation of the glandular structure, and invariably corresponds with the degree of development of the disease.

If the inflammatory excitement be confined to a *portion of the canal*, the patient remarks little or no painful sensation in the ear; there is merely a secretion of mucus that takes place very unexpectedly, and which augments or diminishes in quantity, with the increase or diminution of the chronic inflammation. By ocular inspection, inflammatory redness and partial swelling of the walls of the meatus are discovered, which, when farther developed and more elevated, receives the name of a fleshy excrescence,—a polypus. These granulations may be either soft, spongy, of a very red colour, vesicular, bleeding readily on the slightest touch, sensitive, covered with a copious mucous secretion, pedunculated, or globular; or they may have a broad base, and be of cartilaginous or almost bony hardness, insensible, bleeding little or not at all, and rather of a pale red colour.

Pedunculated polypi, from the force with which they distend the meatus in the course of their somewhat rapid growth, give rise to dragging and pain in the head, even to vertigo and vomiting, whenever the patient raises his head; those with a broad base, on the other hand, must already have acquired a considerable size and press on the membrana tympani, ere they can give rise to symptoms of this kind.

The inflammatory origin of polypi of the ear has very unjustly been questioned. Among many other authors, I need only refer to Rust(*h*) and Krukenberg(*i*), both of whom are agreed that the increased vegetative process which gives rise to polypi, depends on inflammatory action.

The diagnosis of the present disease lies exposed to view. Without relying on the statements of the patient, on investigating the meatus, its morbid conditions, as denoted by the swelling extending to the very entrance of the canal, and by the redness, excoriation, and granulated appearance of its surface, may be recognised at the first glance: or, they may be discovered, only after cleansing out the adherent mucus. In order to satisfy ourselves as to the existence of what may probably be merely a partial tumefaction of the glandular structure, perhaps close to the membrana tympani; of the existence of a polypus and its particular description; or of the possible presence of a foreign body in the canal, the examination must always be made with the aid of the speculum, and in bright sunshine.

The disease, it is true, very often passes from the mildest into the most aggravated form; but it never, even in the worst and most chronic form, extends beyond the limits of the glandular structure. On this point, I may the more decidedly contradict the opinion of Itard, because he has never accurately examined the auditory canal in this disease. Even the most acrid secretion, producing excoriation, does not penetrate to the bone, it never induces true ulceration, nor does it ever destroy the membrana tympani, though it is but seldom that this membrane is free from slight inflammatory redness.

I must, however, admit that it is possible, when from violent cold, or other irritation, the secretion from the glandular structure becomes suppressed, the inflammatory action may be greatly augmented, and may be transferred, not only to

(*h*) Aufsätze und Abhandlungen, aus dem Gebiete der chir. Medicin. i. p. 19.

(*i*) Jahrbücher d. ambulatorischen Klinik in Halle, 1824. p. 206.

the internal ear, but even to the brain, and in both cases may endanger the life of the patient.

Inflammation of the glandular portion of the investing membranes of the meatus, has hitherto been usually treated of under the terms, "external catarrhal inflammation of the ear," or "catarrh of the external ear," and this again according as it assumed a chronic or an acute form (*j*). This is to be deprecated, in as much as a mere etiological circumstance is thus denoted, and not the intrinsic character of the disease. The causal indication is by this means far too readily made the principle of treatment, and the attention of the practitioner directed to the internal and external use of sudorific medicines, which are utterly useless.

Alard in his description of the disease, passes over the most important changes that, in consequence of the inflammatory process, take place in the glandular structure; he merely dwells on the most unimportant symptom, the puriform secretion, which never bears any determinate relation to the nature of the particular disease. Krukenberg (*k*) associates slight superficial inflammation of the meatus, and of the membrana tympani, and the most severe internal inflammation of the ear, under one and the same denomination, "inflammation of the ear." The symptoms included in the description of the disease thus given by him, must be too multifarious for any clear perception of it to be possible; for this can only be expected by separating with accuracy forms of disease, which experience teaches us are essentially different.

The duration of the present disease is quite indeterminate, so that the limitation of fourteen days given to it by Itard and Alard, when allowed to pursue its natural course, can apply only to the mildest forms. Most cases when left to themselves, and especially if improperly treated, last a very long time, without any important assistance being

(*j*) Itard, Traité, &c. i. p. 164. Alard sur le Catarrhe de l'Oreille, pp. 9 and 14.

(*k*) Jahrbücher, &c. p. 203.

derived from nature; and the more serious are the organic lesions that have already taken place in the glandular structure, the less can such assistance be considered probable. It is therefore, very ill-timed consolation that is afforded to such patients, when they are told, that a natural cure may be anticipated, from the changes that take place at puberty.

When, as is usually the case, the discharge from the ears is alone taken into consideration, it appears occasionally as though a cure were about to take place; but on carefully examining the bottom of the meatus, there is always discovered a viscid, dryish, yellowish-green, or brown secretion, which from its small quantity, cannot obtain free exit in the form of a discharge, but which, suddenly, without any appreciable cause, becomes altered in quality, flows out, and is viewed as a relapse, whilst the disease of the glandular structure had never been removed. If, at the beginning, only one ear is affected, the inflammatory process not unfrequently extends without any particular cause (excepting the law of sympathy between the two ears) to the other ear, which had hitherto been free.

A young, plethoric, and robust state of body; a scrofulous or gouty constitution, and previous attacks of the disease, must be considered as *predisposing causes* of this affection.

The most frequent *exciting cause* of the disease is the application of cold, from washing the ears with cold water, cold bathing, draughts of air striking on the ear when heated, &c. Farther, the glandular portion of the investing membranes of the meatus, is easily brought into the inflammatory state above described, by the extension to the ear of acute and chronic cutaneous affections, such as erysipelas, crusta lactea, variola, &c.; by the accidental introduction of foreign bodies, such as plum or cherry stones, peas and beans, grains of corn, glass balls, and insects of various kinds; by the action of hot vapours from introducing fomentations into the ear by means of a funnel; and by the use of acrid, spirituous, or oily fluids, and irri-

tating ointments. Collections of thickened, hardened ear-wax, can never be classed among these causes: frequently repeated observations on this point, have convinced me that indurated wax, remaining, even for a great length of time, in the ear, cannot affect the glandular structure.

The prognosis in those cases in which the inflammatory tumefaction extends equally over the whole meatus, is altogether favourable. This state of things yields with certainty to a judicious, timely-adopted treatment, and but seldom leaves behind any diminution of hearing. But if the chronic inflammatory tumefaction of the glandular structure, involves merely the bottom of the meatus, either covering the periphery of the membrana tympani in an annular form, or altogether concealing this membrane; if the secretion be rather serous, or lymphatic and scanty; the tumefaction very hard, firm, and insensible on being touched with a probe; this must, with but very few exceptions, be viewed as a totally *incurable state*. The insensible pale red polypi, with a broad base, which do not readily bleed, and which have been described above, must be considered without exception as equally incurable. But if, on the contrary, these growths are pedunculated, of a very red colour, sensitive, soft, and easily made to bleed, and if they secrete a copious yellow mucus; then it is very easy to excise them or destroy them by ligature, &c., and thus materially diminish the discharge, the dulness of hearing, and the other complaints. But the complete radical cure of these is, in many cases, quite impossible; the root remains, and from this, in process of time, a new growth arises. The root alone, indeed, perpetuates the chronic inflammatory condition of the glandular structure, the secretion of mucus, and the dulness of hearing. Impetiginous affections of the glandular structure are exceedingly obstinate, as indeed is the case with impetiginous diseases in general, of which those affecting the ears are usually the result. There is but one certain sign in all cases, that the glandular integument is free from any inflammatory excitement, viz. the reappearance of the secretion of cerumen.

In the treatment of this disease, the first object of attention must be to keep the diseased meatus as clean as possible. It must be syringed out once a day, and when the secretion of mucus is abundant, even several times, with lukewarm water, and for this purpose a large syringe should be employed, as stated above. It is not easy, from the curvature of the auditory passage, to throw the stream of water directly against the bottom of the cavity, where the muçus most freely collects, and is retained; a dexterous patient can often manage the injection best himself, so that it shall fall directly on the membrana tympani, and even soften and wash out dried mucus. To many patients, cold or cool water is more agreeable than warm, and their wishes in this respect may be gratified. It is quite improper to use lukewarm milk, infusions of elder and camomile flowers, &c., as injections; nothing is more cleansing than water; and cleanliness is our sole object.

In mild cases, when the glandular integument is suffering only from a simple, recently established, inflammatory tumefaction, even when there is troublesome itching pain, careful cleanliness and covering the ear with a light cap, or a small bag of flour (*l*), to guard it from draughts of air, are sufficient to remove the swelling in the course of fourteen days or three weeks, to allay the discharge, and restore the power of hearing. When the affection depends on a scrofulous disposition, antimonials and similar remedies, united with mild aperient medicines, are proper, and often render a direct topical treatment of the ear superfluous.

If erysipelas of the face has attacked the ear, this organ, even without any positive topical treatment, again becomes free, on the cure of the original disease. Crusta lactea, impetiginous eruptions, scald-head, &c., which exist simultaneously with the inflammation of the glandular integument, and have indeed given rise to the latter, demand the energetic application of treatment founded on the principles of special therapeutics; while the topical affection of the

(*l*) Bohnenmehlkissen. A small bag of bean-flour.

ear, which remains some time after the cure of the former, requires, in addition, to be treated according to rules to be given hereafter.

The entrance of insects into the auditory passage, where they are generally enticed by the odour of the mucous secretion, is best prevented by cleanliness, but they are often not so easily removed as might at first be imagined. The existing mucus should, in the first place, be syringed out, and an attempt made to seize the insect with a pair of forceps, and when this does not succeed, sweet olive oil should be dropped into the ear, (but nothing acrid or irritating, such as oil of turpentine, which has been recommended,) in order to kill the insect, which may then be easily removed by injections of warm water.

Hard bodies, such as glass balls, beans, and peas, which are often stuck into the ears by children when at play, and may even occasion violent general convulsive symptoms (*m*), are removed with still more difficulty than insects. If their presence in the ear has already given rise to violent inflammatory symptoms, and rendered the auditory canal so sensitive that it will not bear the contact of any instrument, bleeding must be had recourse to, according to circumstances. Leeches, however, should always be applied in good number about the ear, the irritation of which we should endeavour to allay by emollient poultices, and by dropping in warm oil, or warm milk. If, by these means, the tumefaction and sensibility are so far subdued, as to allow of our thinking of manual efforts, and the foreign body does not lie beyond the middle of the canal, we may succeed with a pair of forceps, or with a bent lever, in drawing or raising it out. The same methods are to be adopted, modified according to circumstances, and according to the shape of the foreign body, when it has been pushed to the bottom of the meatus, or even into the cavity of the tympanum. In these cases, the difficulties are indeed augmented, and it is

(*m*) Fabr. Hildanus, cent. i. obs. 4.

only by the greatest manual dexterity, and ingenuity in the selection of our mechanical aids, that we can succeed in overcoming them.

Itard (*n*) thinks that when cherry stones, peas, &c. have passed beyond reach into the ear, the sprouting germ may have sufficient firmness to allow of its being drawn out, and bringing the seed along with it; but in spite of the citation from Tulpius, this must be very doubtful. These seeds either admit of being removed before they germinate, by a skilful hand, aided by proper illumination and dilatation of the auditory canal, by means of the speculum, or (when we cannot thus succeed) the sprout will much more probably break off, than bring away the firmly imbedded kernel. The latter must then be detached by a fine scarifying knife.

The old method proposed in these cases, and which is even defended by Du Verney, is to lay open the meatus from behind, forwards, by means of an incision, when the foreign body is deeply imbedded in the bottom of the canal; but this is quite irrational, for the incision must always be made on this side of the bony portion of the meatus, *i. e.* always external to the foreign body which is imbedded. To this plan is allied the barbarous practice of former ages (*o*). A patient, in whose ear a foreign body had become firmly fixed, was to be held up by the legs and shaken, if the accident occurred in a child; but if in a man, he was to be fastened on a plank, with the affected ear towards the board, which was then to be jolted up and down; in both cases, with the hope of thus shaking out the substance.

Our manual assistance will much more frequently be required for polypi of the ear, than for such foreign bodies. Pedunculated polypi can always be reached, either with the ligature, or with a pair of finely made scissors with curved blades, or with a double-edged knife similarly curved, having a blunt and rounded extremity, or with a pair of delicate forceps, furnished at their extremities with

(*n*) Traité, &c. t. i. p. 347.

(*o*) H. Mercurialis de Oculorum et Aurium Affect. Prælect. cap. iv.

five sharp points, in order to lay hold of the polypus, and either twist it off, or tear it out. I have succeeded best with cutting instruments, though I have no objections to offer to those who prefer the ligature. But when the polypi are very deeply rooted, near the tympanum, and are rather of a conical shape, and of little extent, it is very difficult or absolutely impossible to apply the ligature. If the polypus be very soft and vesicular, a simple wound of it, and the subsequent bleeding, will cause it to collapse, and its remains may then be easily removed by the forceps. The particular locality where the polypus grows, and its particular form and firmness, the width of the meatus, and the peculiarity of the case, especially as respects the quietness or restlessness of the patient, must decide the operator in his selection of the mode of procedure. In every case, bright sunshine is absolutely necessary.

The good effects which have been observed from the external application of the liq. laud. Sydenhami to nasal polypi, has led to the use of the same remedy as a means of destroying polypi of the ear. In numerous trials that I have made of this remedy, both where the polypi were soft and where they were thick and of cartilaginous hardness, it has been attended with no beneficial effects; the result has more frequently been unfortunate, inasmuch as the vegetative action of the glandular structure has appeared to me to be augmented by the opiate, and the polypus to grow larger. In a child, after the application of the tincture for eight days, a second polypus arose close to the first.

There is no ground for anticipating the destruction of pedunculated polypi by caustic applications alone. Cauterisation is always a very painful tedious process, and is only admissible in cases where the polypi are inaccessible to cutting or other instruments. It is, however, very different with the roots of the polypi, which always remain behind after every mode of operating. Here we can only carry on the treatment by caustic applications; its completion still, however, remaining very doubtful. It is only in the rarest

cases that the root is effectually destroyed by caustic: hence we should be on our guard not to deceive ourselves by a merely superficial examination of the meatus. The longer the polypus has existed, the more firmly does the root become fixed in the glandular structure; that is to say, the more important are the pathological changes which this structure has undergone, the less hope is there of attaining our object.

Still, however, the attempt should be made, though not with alum, sulphate of zinc, caustic potass, liq. zinci muriatici, and similar things; but with lunar caustic, which alone gives us complete security, in cauterising thoroughly a small and very accurately defined spot. The continued use of this substance, it is true, gives to the discharge a slightly caustic character in the vicinity of the cauterised parts, but this is never productive of injurious consequences. The other remedies mentioned, besides the uncertainty attending their application, are far more painful, especially the caustic potash. The nitrate of silver should be applied in the form of a very thin stick, scarcely a quarter of a line in diameter, and placed in a holder, bent in a zigzag form, and provided with a ferule of platina at its extremity. For this operation a full bright light is absolutely necessary. The last remnant of the root of the polypus is usually extremely sensitive to the action of the caustic, and sprouts up again after a few days at most, so that in the greater number of cases we are obliged to abandon the continuance of the remedy, without having gained our object. In such cases, a solution of acetate of lead, as an injection thrown into the affected ear, answers the purpose best, in keeping down the reproductive power of the root of the polypus and even eventually in completing its destruction. The strength of the solution may be increased to grs. x. to ʒj. of water, and the only difficulty that is encountered, arises from the necessarily slow action of the remedy, so that patients on feeling themselves no longer annoyed by the slight remains of the polypus, are contented with the improvement they

have already derived, and the daily use of the injection is not continued for the necessary length of time, viz. for many months. In these cases, all other astringent remedies have disappointed me; the polypus invariably sprouts again. Of still less avail are general or topical derivative means, by which it is much more likely that the patient will be injured and weakened, than that they should prove the means of completely depriving the small root of the polypus of its supply of fluids.

However efficaciously polypi of the above description may be attacked by art, it must be considered equally ineffective in those which have a broad base, are usually very hard, bleeding but little if at all, insensible, and which, though they may be in some rare instances of a conical form, are even then of cartilaginous or bony hardness. They cannot be reached with the ligature or with cutting instruments; our only resource is the application of caustic. But the painful irritation which these remedies occasion in such growths, without penetrating far into them, induces so great a flow of fluids to the cauterised spot, that the polypus is only still further developed, becomes harder, with increase of all the attendant symptoms, and even gives rise to vertigo and heaviness in the head. In such a state of things, I have endeavoured to apply caustics of other kinds, *e. g.* potassa fusa, or the liq. zinci mur., without, however, being more fortunate. Even free scarification of these growths afforded as little relief; the bleeding that followed was trifling, and the caustic produced if possible still more pain. In one such instance, only, it appeared to me that free suppuration, established behind the ear by means of tartar emetic ointment, diminished the complaints in some degree. But as to the correctness of this observation I am in doubt, for the same remedy did not effect in similar cases, what immediately ensued in the case referred to, on the first application of the remedy, at the time that the treatment of the polypus by lunar caustic was abandoned, on account of the violent irritation set up. Such patients derive most comfort,

and even not unimportant relief, from injections of a solution of acetate of lead. One case in particular I cannot here avoid mentioning. A stalactite-shaped growth hung from the superior surface of the meatus, very near the membrana tympani, and was of so remarkable a bony hardness and density, that it was impossible to pierce it even with the sharpest knife. Yet, in this case, an important improvement in the hearing distance was effected by the application of acetate of lead in solution.

As little is to be done for the elevations of the glandular structure, occurring in the vicinity of the membrana tympani, as for these bony hard growths. The sponge compress would remove the tumefaction with most certainty, if it could be passed down to the diseased spot, within the annular elevation, without giving rise to insupportable annoyance. The most patient forbearance of the sufferer cannot prevent the sponge compress, as soon as it swells, from slipping away from the annular eminence, in consequence of the narrowness of the ring. Putting out of view, therefore, the partial benefit that may be derived from the use of the acetate of lead in solution, the last mentioned organic alterations of the glandular structure must, as yet, be considered irremediable.

Let us now revert to those cases, in which foreign bodies have entered the ear, and where, in spite of the utmost cleanliness, the inflammatory state that they have set up in the auditory canal, remains after their removal. In cases thus simplified, the same treatment is necessary as that required for the originally simple inflammatory condition of the glandular structure, with tumefaction and mucous secretion.

If the swelling be spongy, broken up, and vesicular, no other means than the sponge compress is required, small smooth strips of which, proportionate to the narrowing of the canal, are to be introduced, and allowed to remain for twenty-four hours. The granulations again sink beneath the pressure of the sponge as it swells, the epidermis peels

off, the secretion of mucus and the susurrus disappear, the secretion of cerumen again makes its appearance, and the patient is cured. In these, as in other elevations of the glandular integument, all emollient, mild, oleo-mucous remedies, fomentations, Russian vapour-baths, and the like, are injurious; they only increase the congestion of the morbid parts, and augment the secretion and relaxation. If the glandular integument be swollen, without being broken up in the form of vesicles, whether it be excoriated or not; whether much or little reddened; the secretion from it copious or scanty; thin or thick; of a sweetish or disagreeable odour; yellow or greenish in colour; there is nothing more efficacious than a solution of acetate of lead, (gr. i.—x. to the ℥j of water,) dropped into the ear three or four times a day, after the meatus has been previously syringed out with simple water, and cleansed from any collection of mucus. In more severe cases, it is also necessary to rub in tartar emetic ointment behind the ear, to produce a crop of pustules, which should be allowed to dry, in order to commence the inunction again, as soon as it may be necessary. The ointment should be rubbed in below the mastoid process, partly, in order not to injure the periosteum, and partly, because a more copious discharge can thus be induced. For even when the inunction is performed in the neighbourhood of the ear, beneath the mastoid process, there is, during the first few days, a sympathetic increase of the mucous secretion from the ear, and it is only by continuing the inunction that it becomes an effectual derivative means, when the suppuration is fully established. If the patient be plethoric, and accustomed to high living, and the discharge from the ear very abundant, he should be put on a spare diet, and be well purged, several times a week, with saline purgatives.

By these means, the meatus becomes of a paler colour; the tumefaction goes down, and entirely disappears; the excoriated parts heal; the bad odour of the secretion vanishes; its quantity is gradually diminished, and along

with it, disappear all the symptoms with which it was attended; and the hearing progressively improves. Finally, desquamation of the auditory canal takes place, and sooner or later, the first traces of cerumen again make their appearance.

It is seldom necessary, in consequence of the acetate of lead not answering in particular cases, or being inefficacious in this chronic inflammatory state, to substitute for it other things, such as solutions of sulphate of zinc, nitrate of silver, alum, or diluted pyroligneous acid. The form of ointment is not desirable for any of these substances, however useful they may be in other respects; the glandular structure does not bear well greasy applications. Blisters, when any derivation is necessary, are far too feeble in their action, and at the most do not effect what is accomplished by tartar emetic ointment. Leeches are quite superfluous, and for bleeding, and a general antiphlogistic treatment, as recommended by Jos. Frank, in catarrhal inflammation of the ear, there is not the least indication (*p*).

Itard saw no advantage from purgatives, blisters, setons, and powerful douches of whole buckets-full of a solution of sulphuret of potash thrown into the ear, by which the discharge was suddenly suppressed, to the great injury of the patient, and which it was again necessary to restore, with great effort, and finally to cure by the use of astringent injections. But after all his experience, Itard did not allow himself to be induced to abandon his old method of treatment, and proceed at once to the injections just mentioned (*q*).

Saunders, Curtis, and others, on the contrary, place too much confidence in zinc, alum, lunar caustic, and solutions of acetate of lead. They do not investigate the state of the auditory canal; confine their attention to the existence of the discharge from the ear, and hardly ever think of such means as vicarious derivation. Such practice must not

(*p*) Prax. Med. Univ. Præc. ii. 1, sect. 2, 6, p. 894.
(*q*) Traité, &c. ii. p. 105, et sqq.

only often be useless, but still oftener injurious. Many authors, as well as practitioners, have designated the cure of the discharge from the ear, that accompanies inflammation of the glandular structure, by topical means, as highly dangerous, and have laid it down as a principle, that the cure should be accomplished only by internal, constitutional remedies. This principle, however, is shown to be erroneous, whenever the chronic inflammation has lasted for any moderate length of time, or when it has existed for years. It is, at all events, only in very recent cases, that simple cleanliness and purgatives succeed, as was remarked above, especially if the local affection of the ear depend on a scrofulous constitution of body. In cases of long standing, the completely independent nature of the present disease resists every purely general plan of treatment, and absolutely requires topical remedies, the employment of which is attended by danger only, when instead of being selected from the class of remedies just pointed out, they are chosen from that of acrid, irritating, oleo-etherous, and spirituous substances, which, though they undoubtedly suppress the discharge, do so by increasing the inflammation of the glandular structure. The inflammation may thus be extended to the membrana tympani, the internal ear, and the brain, and give rise to incalculable mischief.

If, by these means, or by cold, the otorrhœa becomes suppressed, accompanied by the development of violent cephalic pains, vertigo, vomiting, and febrile symptoms, then we must by leeches, fomentations, and emollient poultices, applied within and without the ear, endeavour to restore the discharge, which may always be accomplished, when we are called in time, and do not suffer our attention to be diverted, by the really urgent symptoms of other organs, from the most important point—the ear.

But when the inflammation of the glandular structure has been thoroughly cured by a cautiously adapted mode of treatment, complete restoration of sound hearing never fails to ensue, whenever the lesion of the auditory function

depends alone and entirely on the inflammatory condition. Should, however, the hearing still remain defective, although improved, after the complete cure of this abnormal state of the organisation, an investigation of the other parts of the ear should be made, in order to satisfy ourselves that this incomplete result is not caused by some complication with disease of the membrana tympani, the middle, or internal ear; for a plan of treatment is then required especially adapted to the case, of which more will be said farther on.

Case XIII. Madame Von Zitzewiz took cold in the left ear, during a violent snow-storm, and immediately experienced violent buzzing in the ear, great diminution of hearing, and painful sensibility of the external and internal ear to touch, or to any noise; it was only during great surrounding stillness that she heard in any degree with this ear. The right ear was sound. Blisters and emollient oleaginous drops had been applied in vain; when, several weeks after the commencement of the disease, I found the auditory passage more than half closed by pale red vesicular tumefaction of its walls, with a scanty white mucous secretion. My watch was not heard beyond the distance of one inch, by this ear.

I introduced a slip of sponge compress, the swelling of which had, on the following day, not only produced considerable enlargement of the auditory passage, but also a proportionate diminution of the buzzing and of the morbid sensitiveness. The sponge compress was renewed, and completely removed all the swelling redness and discharge, which were replaced by broad cuticular scales. Even the buzzing and difficulty of hearing disappeared; on the second day the patient was cured.

Case XIV. Mr. Plette, eighteen years of age, suffered violent pain in the right ear, immediately after taking a cold bath. The pain extended to the mastoid process, and was accompanied with loud singing in the ears and difficulty of

hearing. The left ear was wholly unaffected. Eight days afterwards, I found the posterior half of the meatus of a deep dark red colour, swollen and narrowed, two-thirds of the surface of the membrana tympani similarly reddened, attended with a moderate degree of pain, with no secretion, which, indeed, had been absent throughout the disease. The ear could only perceive the sound of the watch when brought into contact with it. The singing in the ears had become a gentle chirping. Four leeches over the mastoid process, an emetic, and warm almond oil dropped into the meatus, so improved the patient's hearing, that after three days he heard the watch at a distance of six inches, and after ten days as far off as three feet. A weak solution of acetate of lead was now dropped into the ear instead of the oil: at the end of three weeks all treatment was discontinued, because all the redness and swelling, singing in the ears, and deafness had vanished.

Case XV. H. Retzlaff, two and a half years of age, of a very scrofulous appearance, his skin, over its whole surface, being occupied by large, solitary pustules, has had for three weeks a dark red swelling of the right auricle, (on which there are also pustules of the same kind,) and a similar colour of the meatus, with a slight degree of swelling of its glandular structure, and a secretion of a greenish yellow colour, abundant, having little smell, but acrid and corrosive. The whole external ear and corresponding cheek were inflamed and excoriated by this secretion. The child often cried out suddenly whilst at play, and complained of the right ear, the discharge from which was often coloured by streaks of blood. The left ear was quite healthy. Regarding the scrofulous habitus of the child, its diet was first of all regulated; the diseased ear was simply kept clean by warm water, and to ensure several evacuations from the bowels every day, a mixture was given consisting of æthiops antimonii, resina guaiaci nat., magnesiæ carbon., et rheum. Eight days after this treatment had been employed,

the discharge became changed into a bright brown cheesy secretion, the meatus, in the meanwhile, having become white and lost its tumefaction. Smell, pain, and excoriation disappeared; the ear might be regarded as cured, although the scrofulous disposition, of course, was not removed in so short a time.

Case XVI. Max. V., one and a half years old, very plethoric, although free from any particular scrofulous symptom, has had, during the last four weeks, a discharge of a strongly and offensively smelling purulent fluid, mixed with streaks of blood, from both ears. It commenced in the left, and then appeared in the right ear, was not attended with acute pains, and could not be attributed to any particular cause. Each meatus was red, somewhat narrowed, and the redness extended over the auricle. The hearing was not apparently defective. By careful diet, a due regard to the evacuation of fæces, an injection of acetate of lead, (gr. iv. ad aquæ ℥ij.,) thrice daily, during four weeks, and then substituted by pyroligneous acid, (℈ij. ad aquæ ℥ij.,) the right meatus was freed from all redness and secretion. The same results did not occur in the left ear, which was the worse, till after a spontaneous pustular eruption had broken out behind the ear. The secretion of a copious bright brown cerumen, which had been interrupted, now returned: a certain sign of complete recovery.

Case XVII. Miss K. suffered from an erethitic nervous difficulty of hearing, with entire absence of the secretion of cerumen, which induced me to put into the right ear every morning a piece of cotton containing four drops of the following tincture;—tinct. castorei ℥i. vini gallici albi ℥ij. Subsequently, on account of the burning and itching produced by this application, it was introduced in the evening, when the pains had ceased. After these drops had been applied during fourteen days, in addition to the itching, there occurred a strong burning pain in the ear, which, especially

during the night, produced a great inclination to scratch, with a remarkable diminution of hearing. The tragus was red, swollen, sensitive to every touch, the meatus was narrowed, of a pale red colour, sensitive even to the act of chewing, so that the patient could not eat any thing solid. A mild yellow mucus flowed from the excoriated meatus. There was no noise in the ears. The introduction of warm oil of sweet almonds, saline mineral water, and a blister, did not prevent the continued increase of pain in the ear in the evening, attended with distinct rigor, going off only towards the morning; acute singing in the ears occurred, and the meatus was lessened in calibre to such a degree that it would scarcely admit a crow-quill. A solution of four grains of acetate of lead to one ounce of water was now poured into the ear, the effects of which, in a few days, were to remove the pain, heat, and secretion: the swelling did not disappear till after six days, together with the singing in the ears, and the hearing was then restored to its previous state.

Case XVIII. H. Wilcke, a student of very healthy robust constitution, has suffered since he was four years' old, after an acute cutaneous eruption of uncertain character, from a dark red excoriated swelling of the walls of the meatus of each ear, so considerable as scarcely to admit of the introduction of a crow-quill, and attended with the secretion of a thin, acrid, corrosive, and fetid fluid. The left ear was first affected, and subsequently the right. The left membrana tympani, in addition, was red, thickened, and not very sensitive to the contact of a probe. Tinnitus occurred but rarely, and was very transitory. With the left ear, my watch could be heard only at the distance of three inches: with the right, on the contrary, at a distance of twenty feet. The use of Russian baths and cajeput oil, dropped into the ear, had evidently aggravated the patient's condition. He was put upon low diet, was purged, tartar emetic ointment was rubbed in, first behind the right, and next behind the left ear, and a solution of acetate of lead, (gr. v. aquæ ℥j.,) was

poured into the ears. After this treatment had been continued two months, both ears were free from all morbid appearances; even the left membrana tympani was white, but still thickened and opaque, a condition which very naturally accounted for the continued difficulty of hearing on that side.

Case XIX. Miss Ransleben, fifteen years of age, of feeble constitution, has had for years a slight mucous discharge from the right ear, with difficulty of hearing, alternating also with some degree of susurrus. The discharge was inodorous, the meatus appeared healthy, excepting close to the membrana tympani, in front of which a broad excrescence, of a blood-red colour and a line in thickness, had grown. My watch was audible only at the distance of an inch. The left ear was quite healthy. On endeavouring to surround the excrescence with a small scoop, it bled very freely, and shrivelled up, like a hollow bladder, to a small strip of a pale red colour, which was removed piece-meal by a small pair of forceps, and dried up subsequently after the use of a solution of acetate of lead; so that at the end of some weeks no vestige of it remained, and the noise in the ears, together with the discharge, ceased. The distance at which my watch could be heard, was now only seven inches, in consequence of a remarkable dulness and thickening of the membrana tympani, which had resulted from the long continued morbid determination of fluids to these parts.

Case XX. Mr. Schultz, forty-six years of age, has complained for six months of the escape of a copious fetid discharge from the right ear, attended with great difficulty of hearing, but without tinnitus. In the bottom of the meatus, on one side, was found a very sensitive polypus of a blood-red colour, which entirely filled the canal. Without any certain exciting cause, the discharge suddenly diminished, great vertigo occurred, with frequent vomiting, and incapacity to hold the head upright. Leeching, purging, emollient

fomentations of the ear restored the discharge, and dissipated all the complaints. The polypus subsequently grew so much, that after only four weeks, without any diminution of the discharge, the great vertigo, inability to work, and sense of pressure in the head and ear returned. The polypus was seized by a pair of forceps and twisted off. Much blood was lost, and with this all the complaints instantaneously disappeared. The root shrivelled from the application of the lead, but the membrana tympani was too much thickened to allow of any considerable improvement in the hearing.

Case XXI. Otto Günther, fifteen years of age, has had difficulty of hearing since his childhood, together with a purulent discharge from both ears. The cause of these complaints, and the period of their commencement, were not specified. The discharge was abundant, thick, very fetid, not acrid: in both ears there was an excrescence, of a blood-red colour, very soft, sensitive, bleeding readily when touched, entirely covering the right, and partially covering the left membrana tympani. With the right ear the patient heard my watch, at a distance of eight inches, with the left, at that of nine. There was a loud and constant buzzing in both ears. The polypi were cauterised once or twice a week with nitrate of silver, for the course of three months, until they were entirely consumed. The discharge and buzzing in the ears disappeared; a watch became audible to the left ear at a distance of nineteen feet, to the right at a distance of seventeen feet. The membrana tympani of each side now appeared white and somewhat opaque; hence the incompleteness of the power of hearing.

Case XXII. Mr. Wiesecke, twenty-six years of age, has been subject from childhood to singing in the ears, difficulty of hearing, and purulent discharge from each meatus. A surgeon cut away a polypus which was very visible in the right meatus, but left untouched a broad one which was

concealed in the bottom of the canal, believing that the complaints which the patient continued to make of vertigo, loss of sleep, nausea, &c., foreboded apoplexy, and which he consequently treated with bleedings, purgatives, scanty diet, &c., but without any effect. The patient was at that time unable to leave his bed. I found a large globular polypus in the right ear, which could be only in part removed by scissors, but which was gradually destroyed by lunar caustic, leaving but a small portion. The disappearance of the vertigo kept pace with the destruction of the polypus, whilst a strong nourishing diet quickly restored the sunken powers of the patient. The root of the polypus could no longer bear the contact of the lunar caustic, for every time that it was applied, it occasioned both violent pain and great tingling, so that it became necessary to substitute for it the acetate of lead. The consequence was, that the root entirely dried up. The singing in the ears and the discharge ceased in the same proportion as the excrescence. Two small polypi were also eaten away on the left membrana tympani; but the hearing of both ears continued bad with scarcely any change. This resulted from a considerable thickening of the membrana tympani, which so very easily occurs in polypous excrescences of the meatus.

Case XXIII. Alex. B., three years of age, a very healthy, plethoric boy, had, in the early part of his second year, a vesicular eruption on the back, which very soon diappeared; but as the child used very nutritious food, was followed by a discharge from the right ear. Emollient vapours, mild injections, the dropping in of acrid oils, means that had been used by other physicians, had no effect, whilst sea-bathing rendered the smell of the pus less offensive and diminished its quantity. A thick crusty eruption afterwards occurred behind the ear, the abundant excretion from which, however, exercised no influence on the internal lesion of the ear, although the eruption continued more than six months. At this time I examined the meatus, which was filled with

a greenish yellow, strongly smelling, mucous fluid. The glandular integument was so swollen that a probe, only of small size, could be introduced. The discharge was acrid, and excoriated the auricle and the cheek over which it flowed. The power of hearing, on account of the age of the child, could not be defined. The left ear was quite healthy. The patient was immediately put upon a low diet, and was purged with calomel; the ear was properly cleansed, in consequence of which the excretion of pus behind the ear, which had never been of any utility as a derivative to the disease of the ear itself, ceased of its own accord. This was substituted, in the most effectual manner, by tartar emetic ointment, rubbed in beneath the mastoid process. The discharge from the ear ceased entirely, after the artificial suppuration had been maintained for two months, and was aided by the injection of a weak solution of sulphate of zinc. The meatus again acquired its natural size and colour, but the membrana tympani appeared as white as paper and opaque; so that it is a source of satisfaction that at the present time, three years after the termination of the treatment, the child can hear a watch with the right ear at a distance of six feet.

§ 3. *Inflammation of the Cellular Tissue of the Meatus. (Phlegmonous Inflammation).*

Attended by heavy, dragging, tearing pains in the interior of the meatus, which are at first only slight, but are soon much increased in intensity, extend over one half of the head, or even over the whole, and are much augmented by the least motion of the jaws, as in speaking, chewing, &c., fever comes on, which is particularly violent, towards evening, and is accompanied by great heat, which disturbs the patient, all night, and allows him little or no sleep. The meatus is swollen, red, and almost completely closed; it secretes a thin, reddish, watery, mucous fluid, is extremely sensitive to the touch, and makes the patient feel as though his ear were

stopped by a plug. Violent buzzing in the ear, and great diminution of hearing, are invariably present.

When the focus of inflammation is very limited, there is observed, generally in the anterior half of the canal, an elevation of the size of a pea, with some trifling redness, but considerable tension and heat. Buzzing in the ears, and dulness of hearing, continue for some days, as the complaints increase; till at length, a soft yellow point appears on the summit of the swelling, which bursts, affords great relief, and gives exit to a little yellow pus. When the inflammation is thus limited, general febrile symptoms are either altogether absent, or are observable, only in very sensitive individuals.

The changes in the meatus, which are visible in the form of the disease just described, also occur when the seat of the disease is more extended; but in this case, in consequence of the swelling of the glandular structure of the meatus, even up to its entrance, any close inspection of these changes is impossible. When in these circumstances, after a few days, the painful distension of the ear, and the other complaints have attained their acmé, a sudden discharge of a thick, yellow matter, streaked with blood, is observed, which is followed by a striking remission of all the complaints. This discharge, after continuing a few days, diminishes daily, especially when properly treated; the meatus by degrees assumes its natural width; the opening by which the pus was discharged gradually closes; the membrana tympani is observed to be white and opaque; the singing in the ears is completely lost; though some degree of diminution of hearing still continues, for a short time at least; and, in fine, the scene becomes so completely changed, that the patient very soon forgets his severe malady.

We have here undoubtedly to do with a phlegmonous inflammation of the cellular tissue, (at least as it occasionally appears in the anterior two-thirds of the meatus,) which in this situation, as elsewhere, passes into suppuration, and in consequence of the limited distensibility of the surrounding

parts, in spite of its small extent, may give rise not only to great pain, but also to severe febrile symptoms. In slighter cases the disease pursues the course of a small furuncle, to which it has considerable resemblance, even in external appearance. By the suppuration which invariably occurs, this disease is distinguished in a marked manner from inflammation of the glandular structure, where no such termination ever occurs; whilst by its rapid course, and the absence of any carious bony surface at the bottom of the suppurating spot, as indicated on investigation with the probe, it is equally well distinguished from inflammation of the periosteum of the bony part of the auditory canal. It were more easy to confound it with internal inflammation of the ear, which sets in with equally severe, or even severer symptoms; but the auditory canal, is in this case, at least at the commencement, perfectly free.

Authors have invariably classed this phlegmonous inflammation, together with the slighter form of catarrhal inflammation of the glandular structure, under the general name of "otitis externa," and treated the two without any marked distinction. Even Itard (*r*), who speaks of an "external purulent otitis," does not by that term understand the present disease, but two other affections, which are also perfectly distinct, and neither of which is denoted by his term. In the first place, he comprises under this denomination, the superficial suppuration which occurs under the form of crusts and scabs in the auditory canal, from the spreading of vesicular erysipelas of the face, or pustular eruptions, to the ear; and in the second place a purulent discharge, passing into the meatus, from a fistulous opening communicating with a carious bone: in the former case there is inflammation of the glandular structure, and in the latter of the periosteum, but not of the cellular tissue. Singularly enough, one of the cases detailed by him, is of a description that perfectly corresponds with that which I have given of

(*r*) Traité, i. p. 167, 182.

with it, disappear all the symptoms with which it was attended; and the hearing progressively improves. Finally, desquamation of the auditory canal takes place, and sooner or later, the first traces of cerumen again make their appearance.

It is seldom necessary, in consequence of the acetate of lead not answering in particular cases, or being inefficacious in this chronic inflammatory state, to substitute for it other things, such as solutions of sulphate of zinc, nitrate of silver, alum, or diluted pyroligneous acid. The form of ointment is not desirable for any of these substances, however useful they may be in other respects; the glandular structure does not bear well greasy applications. Blisters, when any derivation is necessary, are far too feeble in their action, and at the most do not effect what is accomplished by tartar emetic ointment. Leeches are quite superfluous, and for bleeding, and a general antiphlogistic treatment, as recommended by Jos. Frank, in catarrhal inflammation of the ear, there is not the least indication (*p*).

Itard saw no advantage from purgatives, blisters, setons, and powerful douches of whole buckets-full of a solution of sulphuret of potash thrown into the ear, by which the discharge was suddenly suppressed, to the great injury of the patient, and which it was again necessary to restore, with great effort, and finally to cure by the use of astringent injections. But after all his experience, Itard did not allow himself to be induced to abandon his old method of treatment, and proceed at once to the injections just mentioned (*q*).

Saunders, Curtis, and others, on the contrary, place too much confidence in zinc, alum, lunar caustic, and solutions of acetate of lead. They do not investigate the state of the auditory canal; confine their attention to the existence of the discharge from the ear, and hardly ever think of such means as vicarious derivation. Such practice must not

(*p*) Prax. Med. Univ. Præc. ii. 1, sect. 2, 6, p. 894.

(*q*) Traité, &c. ii. p. 105, et sqq.

only often be useless, but still oftener injurious. Many authors, as well as practitioners, have designated the cure of the discharge from the ear, that accompanies inflammation of the glandular structure, by topical means, as highly dangerous, and have laid it down as a principle, that the cure should be accomplished only by internal, constitutional remedies. This principle, however, is shown to be erroneous, whenever the chronic inflammation has lasted for any moderate length of time, or when it has existed for years. It is, at all events, only in very recent cases, that simple cleanliness and purgatives succeed, as was remarked above, especially if the local affection of the ear depend on a scrofulous constitution of body. In cases of long standing, the completely independent nature of the present disease resists every purely general plan of treatment, and absolutely requires topical remedies, the employment of which is attended by danger only, when instead of being selected from the class of remedies just pointed out, they are chosen from that of acrid, irritating, oleo-etherous, and spirituous substances, which, though they undoubtedly suppress the discharge, do so by increasing the inflammation of the glandular structure. The inflammation may thus be extended to the membrana tympani, the internal ear, and the brain, and give rise to incalculable mischief.

If, by these means, or by cold, the otorrhœa becomes suppressed, accompanied by the development of violent cephalic pains, vertigo, vomiting, and febrile symptoms, then we must by leeches, fomentations, and emollient poultices, applied within and without the ear, endeavour to restore the discharge, which may always be accomplished, when we are called in time, and do not suffer our attention to be diverted, by the really urgent symptoms of other organs, from the most important point—the ear.

But when the inflammation of the glandular structure has been thoroughly cured by a cautiously adapted mode of treatment, complete restoration of sound hearing never fails to ensue, whenever the lesion of the auditory function

emollient injections. The auricle was extremely sensitive to every touch; it was swollen, and the meatus so contracted, that examination of it was out of the question. Emollient poultices were immediately applied, warm oil of sweet almonds was poured into the ear, and repeated evacuations procured from the bowels. The consequences were, that the swelling and pain of the auricle soon ceased, and the pain in the meatus became so much milder, that, after twenty-four hours, the patient again slept quietly. On the following day, the meatus contained a considerable quantity of thick, cheesy pus, from the sudden escape of which the swelling had collapsed. From the fear of exciting pain in the organ, which had scarcely reposed itself, I did not venture to syringe out the pus, so that I could obtain no information as to the condition of the membrana tympani. The patient could not hear the watch with this ear, but it must be remembered that the hearing of this ear had for a long time been very obtuse. On the 12th, after riding about the town a great deal, considerable pain in the ear recurred, together with the previous sleeplessness, which had not entirely ceased. By the continued use of poultices, these symptoms disappeared on the 14th. An attempt made, after several days, to cover the ear with a bag of camomile flowers, failed entirely, and reproduced the pains, which however, again disappeared, the ear having been lightly covered by a simple cap. The suppuration ceased, the meatus became quite free, and the membrana tympani white, but opaque. The persistent difficulty of hearing was recognised by the patient as the old condition of the ear, and he was unwilling that it should be any more examined internally.

Case XXV. Mr. Sch——, twenty years of age, very strongly built, on the 12th of August crossed the street during the night, without having on any covering to his head. He had been previously for a considerable time in a hot chamber. He slept well, but on the 13th, had violent pains in the head, and singing in both ears. The night of the 13th he passed very restlessly, was feverish, and suffered such

extreme pain, that, of his own accord, he applied twelve leeches behind each ear. The pain in the right ear was thus entirely removed, and that in the left so far allayed, that a piercing pain in the depth of the meatus was all that remained. This was still the case on the 16th, the pain then being particularly perceptible, only when the teeth were pressed together. The patient felt as if there was a plug in the ear; complained of continual singing in the ears, great difficulty of hearing, disagreeable taste, and loaded tongue. The gastric complication was removed by an emetic, but the affection of the ear was in no degree diminished. Purgatives had proved equally inefficacious. The meatus was completely closed from swelling. Warm emollient poultices were applied to the left ear, and were continued until the 20th, the complaints growing worse and worse; but now a thick pus, mixed with blood, suddenly escaped from the ear. The swelling collapsed, the sense of pressure, the singing in the ears, and the other symptoms disappeared together; the membrana tympani appeared very white, but not opaque; the suppuration discontinued after a few days, so that the patient heard as well with the left ear as with the right, eight days after the bursting of the abscess.

§ 4. *Inflammation of the Periosteum of the Meatus Externus. (Inflammation from Metastasis.)*

Without the patient having complained of any particular pain, there is remarked, deep in the meatus, a red spot somewhat swollen, which, after a time, opens in such a way, that a cavity is formed, whence issues a tolerable quantity of thin, fœtid, filthy pus. Whenever the meatus is cleared of the pus which collects at the bottom of it, there is a striking diminution of the difficulty of hearing, which attends the disease. At the bottom of the fistulous opening whence the pus issues, there is detected by the probe, a rough surface, either that of the bony meatus alone, or of the mastoid process also, to the periosteum of which the

inflammatory action occasionally extends. In the course of the disease, larger or smaller portions of these diseased osseous parts are thrown off, and making their appearance at the fistulous opening communicating with the meatus, they are either carried out along with the pus, or may be easily removed by the forceps.

When the dead, carious parts are removed, either by perceptible, or imperceptible exfoliation; and the influence of that dyscracy on which the caries depends, has been destroyed by the favourable co-operation of active natural and artificial means, the topical disease is cured without any great difficulty. The curative efforts of nature in these cases may be so powerful, and may take so perverted a direction, that the meatus may be completely obliterated for some lines in length, with entire suppression of any secretion from the glandular structure; the result of which is, an important degree of difficulty of hearing.

The disease commences most distinctly in the periosteum of the bony portion of the meatus, though it must be admitted that it may and does occur secondarily, from the extension of caries of the petrous portion of the temporal bone, and of the mastoid process. Primary caries of the bony portion of the meatus, has never yet been described by any author, not even by Itard (*t*); neither under the head of "Idiopathic and Symptomatic Purulent Otorrhœa," where he treats of caries of the cells of the mastoid process and of the petrous bone; and only incidentally mentions that the bony portion of the meatus may be implicated in the carious destruction; nor under the head of "Deafness from Metastasis," where he never once examines the meatus, and consequently has deprived the cases detailed by him of their proper touchstone, and of any practical value.

The diagnosis depends on examination with the probe, which, on being introduced through the fistulous opening, is felt to strike against the carious surface of the bony

(*t*) Traité, &c., i. p. 207, et. sqq.; ii. p. 379.

portion of the meatus; the membranous portion of the canal and the membrana tympani being, in other respects, sound, unless they happen to suffer accidentally from some other independent disease. The progress of this inflammation of the periosteum is exceedingly chronic; many years may elapse, till either the powerful development of the juvenile frame, or appropriate medical treatment, puts an end to the exfoliating process, and with this, to the suppuration, so that the opening heals without further trouble.

Scrofula is the most frequent predisposing cause of this caries of the bony portion of the meatus; but, in the total absence of any practical information on the subject, the question must be left undecided, whether, or not, lues and a gouty disposition may also exert a similar influence over this part of the organisation.

The most important exciting cause that we are practically acquainted with, is the disturbed course of scarlatina and measles; and the natural small-pox would probably prove still more injurious.

The prognosis is here always of a gloomy character; though the early age at which the inflammation generally takes place, when the period of full corporeal development has not yet arrived, may induce us to anticipate a less unfavourable termination, than when the disease occurs at any other time of life, when that vital period has already elapsed. If the injury which scrofula has produced be considerable, the carious bone will inevitably be thrown off into the meatus; and the discharge is readily cured. When obliteration of the auditory canal has occurred, the prognosis must be very doubtful; for we cannot foretell with accuracy, either how far the obliteration of the meatus may extend, or what complications may be discovered in the ear, beyond the obliterated part. Even in the most favourable cases, it is difficult, not, indeed, to lay open the obliterated part, but to keep it open.

In the treatment of the disease, we must in the first place keep our attention fixed on the cachectic foundation of the

malady, and endeavour to remove or ameliorate this state; confining the topical treatment to keeping the meatus clean. If a spicula of bone make its appearance at the fistulous opening, this should be removed with the forceps; the opening itself scarcely ever requires any artificial enlargement. The application of acrid tinctures, with a view to accelerate the process of exfoliation, can by no means be recommended; and with regard to the recommendation of Krukenberg, I must confine myself simply to giving his statement, that he has seen great benefit from the internal use of phosphoric acid, combined with asafœtida. After exfoliation has taken place, the fistulous opening is soon cured, without any active artificial aid, provided the general fundamental affection has been removed (*u*).

Where adhesion has taken place between the sides of the meatus, the stricture thus formed must be divided, before we can decide on its depth, and the extent and importance of the morbid state.

For this purpose, a trochar answers best, *e. g.* such a one as is used for the puncture of hydrocele. It should be pushed forward, through the middle of the stricture in the direction of the auditory canal, till it no longer meets with any resistance, indicating that it has passed beyond the stricture. The opening thus made, is then to be dilated, by making a crucial incision in the parts, either with a small, straight, blunt-pointed bistoury, or with a small knife, having its point rounded, but sharp. If the adhesion prove of small extent, and, in a measure, membranous, the flaps made by the crucial incision may be excised, and the wound healed by a few touches with the nitrate of silver. This operation, however, becomes much more difficult, if the adhesion extend for several lines in length, and has assumed a hardness approaching to that of cartilage. The divided parts are extremely sensitive to the least touch;

(*u*) Andral advises the use of a strong solution of potash, as an injection, in these cases, when there is no increased sensibility, or other evidence of active inflammation. (Tr.)

and I have never yet succeeded in preventing their re-union by the introduction of catgut bougies, though these have been smeared with ung. zinci or ung. plumbi. We succeed best by touching the parts with lunar caustic, which, by means of a small holder, may be passed through the whole length of the stricture. The sponge compress is, if possible, of still less use than the catgut bougies; the force with which it swells, never fails soon to push it out of the wound again, the extreme sensitiveness of which endures the sponge compress worse than it does the bougie. If carious bony spiculæ are found beyond the stricture, the discharge from the ear is re-established, just as it was before the division of the stricture, and continues till these bony spiculæ are thrown off. Even after the cicatrisation of the adherent parts, that have been thus divided, the hearing remains very feeble; partly because the operation does not restore the meatus to its natural form, and partly because the delicate structure of the membrana tympani has almost always suffered from the antecedent inflammation, and has become thickened, by which an incalculable influence is exerted on the function of hearing.

I am, unfortunately, unable to detail any complete cases, in connection with the present subject; for hitherto none of the patients have had sufficient perseverance to await the termination of the treatment, which in these cases must always be very lengthened.

Sect. III.—Diseases of the Membrana Tympani.

The very concealed situation of this membrane has long given rise to, and supported, the most erroneous and hypothetical views respecting its morbid conditions; under the influence of which views, I myself formerly denied the possibility of the membrana tympani suffering from independent disease.

Willis (*v*) was the first person, who attributed to the membrana tympani purely hypothetical diseases, and from

(*v*) De Animâ Brutorum, Op. Om., pars. post., p. 108.

the high reputation which, on other subjects, he most justly enjoyed, he found, even on this point, credulous adherents enough, who, without any further investigation of the subject, placed implicit reliance on his assertions. Willis, for example, relates that an individual, worthy of credit, was acquainted with a woman, who, in spite of her deafness, heard every word that was said, as long as she remained in a room in which a drum was beaten; and again, that he knew that an individual, whose hearing was defective, heard every thing during the ringing of a peal of bells, in a belfry near his residence. From these facts, Willis concludes, that the presumed relaxed membrana tympani in these two persons, was again restored by the noise of the drum, and of the bells, to the proper degree of tension necessary for good hearing, and that their audition was thus, for a time, much improved. His theory, however, rests on uncertain data; he did not see the patients himself, much less convince himself by ocular evidence, of the supposed relaxation of the membrana tympani; but subjective symptoms and theoretical principles are not to be depended on in diseases of the ear. Objective symptoms alone ought to decide on the morbid condition of the membrana tympani; especially as it is accessible, in its whole extent, to the investigation of our senses. It may be distinctly seen whether it is polished or dull; whether it is transparent or opaque; whether only partially so or in its whole extent; whether its depression exists, or whether from thickening this has become defaced and indistinct. As no such ocular inspection was instituted either by Willis himself, or those who detailed the cases to him, the conclusions deduced by him from their communications, should be rejected as altogether untenable; and the more so, since transient improvement of their impaired hearing, during loud monotonous noises, is very frequent with patients, whose membranæ tympani I have innumerable times observed to be shining, extremely dry, transparent, and its concavity so distinctly formed, that there could not be the

slightest doubt as to its degree of tension being natural and unaltered.

Du Verney (*w*) and others have made relaxation of the membrana tympani to depend on the actual existence of discharges from the ear, or on tumefaction of the glandular structure of the meatus. But even in such real morbid states of the auditory canal, I have, in innumerable instances, convinced myself, by ocular inspection, of the perfectly sound state of the membrana tympani, with respect to its degree of tension. When the membrana tympani is affected, it suffers from inflammatory excitement, thickening, and opacity, but never in any appreciable manner from relaxation.

Saissy (*x*) believed that such a condition of this membrane must exist, when the tensor tympani is destroyed by suppuration, (but he does not reflect that this destructive suppuration, must necessarily destroy the membrana tympani also,) when a secretion of mucus has taken place in the meatus, or in the cavity of the tympanum; or when dropsy of the latter exists.

In all these cases, however, putting out of the question the supposition of dropsy of the tympanum, which is contrary to all experience, there is not the slightest indication of relaxation of the membrana tympani. Beck (*y*) carries his unfounded notions so far, as to suppose that the tendon of the tensor tympani may be ruptured by violent sneezing! The membrana tympani then falls forward into the auditory passage in the form of a sac; and the ossicula auditûs are thrown out of their natural position. It is certain, however, that the eye of the anatomist has never discovered any such rupture of the tendon of the tensor tympani; nor has any such sacciform protrusion of the membrana tympani ever been observed. Beck alleges nothing in support of his hypothesis, but untenable theoretical arguments, *e.g.*

(*w*) Traité de l'Organe de l'Ouïe, p. 175.

(*x*) Essai, &c., p. 41.

(*y*) Krank. d. Gehörorgans, p. 210, et sqq.

the injurious influence of the south wind, or of a moist atmosphere on the faculty of hearing. But patients suffering from nervous deafness, and from catarrhal diseases of the external and middle ear, alike experience this susceptibility of the hearing to the injurious influence of the south wind, and of a moist atmosphere, without the slightest alteration in the form or situation of the membrana tympani, when examined in such a state of the atmosphere, having ever been observed.

Besides the authors already alluded to, Leschevin, Gniditsch, Jos. Frank, Riedel, Vering, and others, are all haunted by the notion of this hypothetical relaxation, without, however, having adduced any other, or better proofs of the existence of the phantom, than those which have already been refuted. The supposition, supported by the same authors, of a preternatural tension of the membrana tympani is equally groundless. The same arguments, inversely applied, are adduced in its support, *e. g.* that the disease may be occasioned by spasm of the tensor tympani, and that a moist south wind usually diminishes the tension, and along with it the accompanying dulness of hearing.

On this subject, Curtis distinguishes himself by his extraordinary ignorance of the structure of the membrana tympani; for he believes it possible for the position of this membrane to be altered by sudden loud noises, such as a loud clap of thunder or the firing of a cannon; by which it may be drawn inwards towards the ossicula auditûs, and thus become concave externally. This lecturer on the anatomy of the ear, does not know that it is the normal condition of the membrana tympani to present externally a concave form. He therefore recommends the removal of this pretended abormal condition, either by the patient himself, by driving the air forcibly against the inside of the membrana tympani, by means of forced expiration, with the mouth and nostrils closed; or, in cases where the Eustachian tube is closed, this is to be effected by means of a slender tube, accurately fitted to the meatus, the small extremity

of which the physician is to put into his mouth, and by suction, exhaust the meatus of the air contained in it, and thus draw back the membrana tympani into its natural (!) position, and restore the patient's hearing. By propositions such as these, Curtis characterises, in the most striking and pitiable manner, the crudeness, not only of his physiological, but also of his pathologico-therapeutical views (*z*).

Saissy (*a*) takes it for granted, that the membrana tympani may be pushed forward into the auditory canal, so as to be rendered convex externally, in which case it must either be ruptured at the time, or must previously have been so; in these cases he advises that the membrane should be pushed back with the blunt end of a probe, though neither his own experience, nor that of others, has afforded him the least proof that this is practicable. Again, he also speaks of a convexity of the membrane towards the cavity of the tympanum, as of a morbid condition, which is to be remedied by injections through the Eustachian tube. Notwithstanding such specimens of their scientific ignorance, both Saissy and Curtis still maintain the highest reputation as aurists.

After these observations, I may be allowed to banish relaxation and tension of the membrana tympani from the catalogue of diseases met with in practice, in which I have, indeed, been preceded by Itard, who, however, has not adduced his reasons.

I must also deny that rupture of the membrana tympani takes place, unpreceded by inflammation, though the possi-

(*z*) Cleland, not Curtis, is the author of the above proposition, which is to be found in Cleland's paper in the Philosophical Transactions, whence it was extracted by Curtis, and published in his Essay on the Deaf and Dumb. It is difficult to understand how Kramer should have mistaken Curtis as the author, unless it arose from his having made use of the German translation of Curtis's Essay. For, though Curtis leaves us to infer that he approves of Cleland's views, yet he distinctly refers to them as Cleland's, and it is, therefore, but fair that they should not be charged on Curtis as his own. (Tr.)

(*a*) Essai, &c., pp. 49 and 47.

bility of this is vouched for by Du Verney, Leschevin, Itard (*b*), Saissy, and Curtis (*c*). The membrana tympani is not only tightly stretched, and fixed by its whole circumference into a bony ring; but also by its oblique position, as well as by the tortuous course of the meatus, is ensured against the too violent action of sonorous vibrations, and finally so supported by the long handle of the malleus, which lies across the diameter of the membrane, that neither sneezing, blowing the noise, and the like, nor injections, can effect any alteration in its site. I have satisfied myself that this membrane can neither be injured nor altered in position, by a powerful stream of water from a large syringe, directed immediately against it; not even though it be already partially destroyed by suppuration; nor can a forcible stream of air, from the air-press, directed against the inner side of the membrane, alter its concave form, and still less rupture it. Itard (*d*) considers perforation of the membrana tympani to be in many cases a primitive disease, which must be viewed as a species of erosion, that eventually gives rise to perforation. But this also is an error; for perforation has never yet been observed without more or less distinct traces of previous inflammation; but Itard could not be expected to know this, for he understands examining the membrana tympani, only when the meatus externus is particularly wide and well adapted for such an examination. Patients frequently imagine that they have punctured the membrana tympani, with hair-pins, ear-pickers, or similar articles; but on closer examination, by means of ocular inspection, or the air-douche, I have never found this to be the case; and from the geniculated curvature of the auditory canal, and its great sensibility, I consider it as almost impossible for the membrana tympani to be accidentally perforated.

It is true that we meet with perforation of the membrana tympani, without the discharge externally of any purulent

(*b*) Traité, ii. p. 159. (*c*) Cases illustrative.
(*d*) Traité, i. p. 360.

or mucous fluid; but even in these instances there is always a small quantity of viscid, muco-purulent matter at the bottom of the meatus, and the membrana tympani, whenever it is not already destroyed, is as constantly found reddened, thickened, and opaque. It is, however, only by accurate examination of the auditory canal, during bright sunshine, and by the aid of the speculum, that these certain results are to be obtained; whilst by means of the probe, which was employed by the above-mentioned practitioners, we never can detect such morbid changes.

I cannot here omit giving an example, as a warning, how far idle speculations may lead astray. Ribes (*e*) assures us that he has found the handle of the malleus broken off; and he is hence induced to suppose, that, from whatever cause such a fracture may occur, the friction of the fractured ends of the bone may destroy the membrana tympani. But, unfortunately, he can adduce no practical confirmation of either one or the other. He also thinks that a plug of hardened ear-wax, by pressing on the membrana tympani, may erode or perforate it; though this opinion is not only unfounded on experience, but is opposed to all experience. I have very frequently had occasion to remove accumulations of this kind, that had been neglected for years, without having ever observed any thing more than, at the utmost, in particular cases, a slight partial redness of the membrana tympani, which has disappeared spontaneously in the course of a few hours. On the other hand, I have still more frequently met with perforations of the membrana tympani in patients in whose meatus I was not able to detect the slightest trace of cerumen.

Finally, I may notice the thick firm membrane, which is said to have been observed, covering the membrana tympani of newly born children. Fabricius Hildanus was the first person who made mention of this membrane, and most probably is the only one who has seen it. Du Verney has

(*e*) Dict. des Sciences Med. vol. xxxviii. p. 30.

observed it, only in an adult, and, in all probability, in this instance, he was deceived by a partial abrasion of the membrana tympani. On this question, Leschevin, Saissy, and others, do not speak from their own observation, but simply repeat what they have met with on the subject in the works of their predecessors.

Morgagni (*f*), however, refutes the whole hypothesis so completely, that I need merely refer to him. He thinks that, in all probability, the supposed membrane which has been observed, was nothing more than the caseous matter with which the whole cutaneous surface of newly born children is covered, that had become firmly adherent to the membrana tympani; but which would much sooner have become dry and fallen off, than been converted into a thick firm membrane (*g*).

Many authors, and among them even Itard, are still of opinion, that perforation of the membrana tympani does not necessarily entail debility of hearing; an error which probably has arisen from their having judged of the state of the hearing, by the possibility and mode of carrying on conversation, instead of making use of an accurate, invariable standard of measurement (*h*). I refer to page 28, et seq. for what has been said on this subject. Careful and very frequently repeated examinations of patients, whose membrana tympani was perforated, have taught me, that this morbid state is not indeed by any means followed by complete deafness,

(*f*) De Causis et Sed., i. p. 227.

(*g*) Mr. Tod, in his Treatise on the Anatomy and Physiology of the Ear, speaking of the fœtal membrana tympani, says, "Its external surface is covered with a thin membranous lamina, which secretes a thick viscid matter, of a whitish colour, to defend it from the liquor amnii. This lamina and its secretion are gradually removed soon after birth, by a process of nature." (Tr.)

(*h*) Traité, ii. p. 159. Itard, however, says, "If the opening in the membrane be considerable, and especially if it comprise the point of insertion of the handle of the malleus, deafness, more or less marked, is either the immediate, or at least the eventual consequence." (Tr.)

but invariably by more or less dulness of hearing, according to the extent of the injury which the membrane has sustained; according as this is situated before or behind the handle of the malleus; and according as it is confined solely to the membrana tympani, or is attended by loss of the ossicula auditûs and other morbid changes of the ear. I have seen patients of this description, who indeed could hear my watch at a distance of five or six feet, but still not at a distance of thirty feet, as a sound ear can; and by this slight degree of deafness they were not on the whole much incommoded, although perforations of the size of a pea were observed in the membrana tympani. Other patients again could scarcely hear the same watch at the distance of half an inch; in which instances there must have been some other morbid alterations of the cavity of the tympanum, besides perforation of the membrane.

After these observations, it follows, that, with respect to the membrana tympani, we have only to consider its inflammatory affections and their results, such as opacity, thickening, perforation, purulent secretion, and polypous growths, as practically important forms of disease.

§ 1. *Acute Inflammation of the Membrana Tympani.*

The patient suddenly experiences, at the bottom of the meatus, more or less acute pain, which extends even to the throat, and is accompanied by buzzing in the ear, diminution of hearing, and various morbid sensations in the ear, such as, the feeling as though an insect were fluttering in and about the ear, &c. The membrana tympani is, occasionally, only slightly reddened, and not all at once throughout its whole surface; the auricle and the auditory canal are unaltered, and the patient is free from fever; so that the symptoms, on the whole mild, if the patients take care of themselves, not unfrequently disappear in the course of a few days.

But when, on the other hand, the inflammation becomes

more extended, or of greater intensity, or when, even from the first it sets in with more violence, the membrana tympani is observed to be of a blood-red colour, swollen, looking as though it were covered with small glands, and in some measure protuberant. Thick bundles of vessels are seen running across it, it is opaque, and the point of insertion of the handle of the malleus can no longer be distinguished. The pains are very acute, and of a tearing, dragging character, but still confined to the ear, and not increased by motions of the lower jaw. The hearing is materially enfeebled, and very sensitive to the least noise; the singing in the ear is loud; there is high fever, especially towards evening, which continues till, as morning approaches, it remits on the breaking out of profuse perspiration. Here, also, the auricle and the auditory canal are perfectly free; but, during the continuance of the inflammation, the ceruminous secretion disappears from the meatus.

If the disease be allowed to pursue its own course, or if it be treated by acrid irritating injections, a watery or purulent discharge, mixed with blood, makes its appearance, when the pain, and occasionally also, the singing in the ears are mitigated; but, on the other hand, the dulness of hearing is augmented, and there are observed, generally before and below the point of insertion of the handle of the malleus, one or more openings of the size of a pin's point, or as large as a pea, and occasionally even two-thirds of the membrana tympani are destroyed. On those portions which are not destroyed, and which are reddened and thickened, polypous growths of various sizes and consistence spring up.

If, on the contrary, the case is properly treated, there is an abatement of the fever and pain, which are replaced by a sense of fulness and weight in the ear; the tinnitus diminishes, although the dulness of hearing frequently increases, in consequence of the lymphatic effusion into the lamellæ of the membrana tympani, which accompanies the subsidence of the inflammation. The redness of the membrane now disappears, and single blood-vessels are alone seen;

subsequently, the tumefaction and roughness of the surface of the membrane disappear; it throws off large yellow transparent scales, and thus again becomes white, but not, however, transparent. The normal transparency is not restored till still later, and in the worst forms of the disease it is never recovered at all, nor does the hearing, in these cases, ever regain its natural acuteness and sensibility. The secretion of cerumen, which had been suppressed, again returns on the cessation of the pain.

If the inflammation has produced a very considerable effusion of lymph between the laminæ of the membrana tympani, it occasionally becomes consolidated and incorporated with the membrane, and thus converts it into a structure resembling cartilage, or even bone, in hardness, which is insensible on being touched with the probe.

The inflammatory character of this disease has been entirely overlooked, especially in the slighter forms, and under the appellation of *ear-ache*, it has been subjected, most improperly, to a local irritating plan of treatment. Itard (*i*), however, treats of a purely nervous ear-ache, in which his dread of the local application of opium would have been altogether groundless, if this so called nervous ear-ache were anything but inflammation of the membrana tympani, which is only aggravated by opium. Even Itard, however, would certainly have recognised this as an inflammatory disease, had he not been deprived of the necessary aid afforded by local inspection of the membrana tympani.

I have certainly never observed ear-ache without evidence of inflammation either of the meatus or of the membrana tympani, and must, therefore, deny to those persons the right of pronouncing a decisive opinion on the existence of a nervous otalgia, who do not understand investigating the membrana tympani in bright sunshine, and with the aid of the speculum, and who are not in the habit of doing it (*j*).

(*i*) Traité, i. pp. 286, 380.

(*j*) Convinced as I am, that inflammatory affections of the membrana tympani are too generally altogether overlooked, and seldom receive that

From inflammation of the internal ear, that of the membrana tympani is distinguished not only by its greater mildness, but also, and chiefly, by its being accompanied, from the commencement of the disease, by evident morbid alterations of the membrana tympani, which, in internal inflammation of the ear, in spite of the severity of the febrile symptoms, are altogether wanting at the onset of the disease, and are only superadded during its subsequent progress; that is to say, when the inflammation has seized the membrana tympani, and its rupture is threatened by the accumulated pus.

The duration of the slighter cases of inflammation of the membrana tympani does not extend beyond a few days, whilst, on the other hand, the more severe cases may last for many weeks, when left to themselves. Generally, only one ear suffers at a time, though it very frequently happens that the disease attacks both simultaneously. Alternating disease of the ears, a species of transition of the inflammatory process from one ear to the other, is certainly very rare. If the acute period has elapsed, and diseases consequent on this have occurred, these may last for an indefinite period of time, for many years, or even during the whole life of the patient, without undergoing any alteration.

Acute inflammation of the membrana tympani, though not indeed very rare, is yet infinitely less frequent than chronic, and this is much more generally followed by the above-mentioned sequelæ than the acute form is. Cold is here,

attention which they imperatively demand, I am very unwilling to appear, in any way, to diminish the force of Dr. Kramer's observations on this subject. I cannot, however, concur with him in denying the existence (which he appears to do,) of a nervous otalgia. The pain attendant on neuralgic affections of the face, not unfrequently commences in the ear, and that this is of a nervous character, appears sufficiently proved by its sudden accession and equally sudden remission, as well as by the undoubted neuralgic character of the succeeding affection. It seems, indeed, almost inconceivable, that the ear should be free from neuralgic affections, when other parts supplied by the facial and fifth pair of nerves, are so constantly the seat of such complaints. (Tr.)

again, the chief *exciting cause* of the disease; though its influence is occasionally so insignificant in appearance, that the patients are not at all conscious of it, at the moment of its application. Drops, injections, and salves of an acrid nature, hot vapours directed against the membrana tympani, as is frequently done, by means of a funnel, or other still more violently exciting methods; electricity, galvanism, &c. frequently excite inflammation of the membrana tympani, though not of the most violent degree. Indurated ear-wax never has this effect, not even when it remains for years in the auditory canal. The utmost that is observed, in particular cases, after the removal of this, is a number of blood-vessels, which run along the handle of the malleus at its tuberculated extremity, and these always disappear in the course of a short time, without any artificial assistance. In other cases, the first development of the disease may be referred to the period at which the cutaneous inflammatory process, attendant on measles or scarlet fever, has been transferred to the membrana tympani, in consequence of imprudence, or similar injurious causes, having interfered with the natural progress of these exanthemata.

The prognosis is usually favourable, provided the inflammation be attacked before it passes into suppuration, or gives rise to other diseases; though even during this first period of the disease, opacity and thickening of the membrana tympani may take place, and the hearing be permanently injured. Art can, of course, do nothing to remedy the perforation of this membrane; but the accompanying inflammation may be removed. Radical treatment of polypi of the membrana tympani rarely or never succeeds; the roots of these bodies cannot be destroyed, and they always manifest the greatest disposition to grow again. In thickening, hardening, and cartilaginous degeneration of the membrana tympani, artificial perforation of the membrane may, indeed, be resorted to; but this is far from affording the results which, from theoretical considerations,

might have been expected. The treatment may and ought to be very simple. In the first place, the ear should be protected against the cold air, by means of a light linen cap, and confinement to the room in bad weather; and any acrid local applications that have been employed, and have given rise to the inflammation, should be abandoned. When the redness of the membrana tympani is slight and merely partial, we may, by these means, succeed in removing the trifling inflammatory accidents, and, at the utmost, all that is required, is the slight assistance obtained from dropping into the ear a weak solution of the acetate of lead. If, however, inflammation has seized on the whole extent of the membrana tympani, if it be very painful and swollen, and the patient feverish, ten or more leeches should be put on around the ear, emollient poultices applied, warm almond oil dropped into the ear, and powerful saline purgatives given. Solution of acetate of lead is here quite improper; it only favours the thickening of the membrane. If, after having overcome the violence of the inflammation, the pain, &c. by the above means, the process of consecutive organic alterations of the membrana tympani continues for a considerable time; tartar emetic ointment must be rubbed in below the mastoid process, in order to effect a powerful derivation from the ear. Should, however, a muco-purulent secretion have been already established, with or without the destruction of the membrana tympani, next to tartar emetic ointment, solution of acetate of lead, dropped into the ear, is the remedy from which we may expect the most powerful assistance; and of this we can avail ourselves even when tartar emetic ointment cannot be made use of; either because the patient cannot endure it for a sufficient length of time, or on account of the disfiguring scars which it leaves behind. The strength of the solution may be increased to ten grains of the salt to the ounce of water, according as the state of the morbid parts may require.

If polypous growths arise on the tympanal membrane;

and if these have, as is usually the case, a short peduncle; they can only be removed by means of a delicate, double-edged knife, having a bent, sickle-shaped blade, and a blunt, rounded extremity; the remains of the polypus being carefully touched with lunar caustic, whenever the great proximity of the membrana tympani, and the acute pain which is thus generally excited, allow of such a procedure. But the caustic is often far surpassed in efficacy by the acetate of lead, applied in the form of solution; as the reproductive power of the root of the polypus is thus, with most certainty, kept down. I have even observed that the polypus of the membrana tympani, under the influence of the solution of the acetate of lead, shrivels, and is eradicated even more certainly than can be expected from any operation. For the operation with the knife, a firm hand and a sharp eye are requisite. Previous to operating, the meatus must be cleansed with the syringe, or gently wiped out with a fine hair pencil, or piece of sponge. From the depth at which the polypous growths of the membrana tympani are situated, it is seldom or never possible to pass a ligature, and this is the less advisable, as from the dragging of the ligature, the membrane itself is very easily drawn forward and endangered. Neither can we get at deeply rooted polypi, either with very fine scissors, or with small hooked forceps, as, from the narrowness of the auditory passage, there is not room to open the instruments sufficiently wide.

When small growths, of the size of lentil-seeds, make their appearance on the membrana tympani, the application of lunar caustic should first be attempted, (but with great caution,) as in the treatment of the remains of the roots of larger polypi. In case the lunar caustic does not answer our expectations, solution of acetate of lead again remains our only resource. These small polypi are always of the most obstinate class. If, however, the growths be of a whitish colour, insensible to the touch, firm, of cartilaginous hardness, and have a flat broad base, any treatment of them would be vain, and the application of caustic directly prejudicial;

it would only augment the growth of the polypi. Even where we succeed in eradicating polypous growths so completely as to destroy the last remnants of them, and no destruction of the membrana tympani has occurred, we cannot confidently expect the hearing to be completely restored, nor often even materially improved; for the development of polypi in the membrana tympani gives rise to morbid alterations of its structure so important, that its normal faculty of transmitting sonorous vibrations to the internal ear, remains for ever, more or less, impaired.

Simple opacities of the membrana tympani, either in the form of white specks, or of a general white, opaque discolouration, are quite beyond the reach of art; though Jos. Frank is of opinion that they may be removed, by means of setons in the arms, and injections of ammonia, corrosive sublimate, &c. Experience has never confirmed these views, which are purely theoretical, and for which, indeed, it is to be hoped, (for the patient's sake,) that even the great name of Frank (*k*) never will obtain entrance into practice. Deleau professes, indeed (*l*), to have cured a thickening of the membrana tympani, by a blister and injections of the sulphuretted water of Bareges, &c.; but he is not justified in boasting of this cure, for he did not investigate the membrana tympani after the treatment; he merely gives the patient's statement, that "the hearing is better." He even confesses, farther on, that the same treatment of the same malady, in other cases, was of no service.

If the membrana tympani be considerably thickened, quite insensible on being touched with the probe, and of cartilaginous hardness; and if, in consequence of this, the hearing has seriously suffered; there remains nothing for the improvement of the latter, but *perforation of the membrane*. Even in these cases, however, in which the operation is really indicated, it ought not to be had recourse to, excepting when

(*k*) Prax. Med. Præcepta, ii. i. sect. 2 b., p. 908.
(*l*) Mem. sur la Perforation, &c, p. 148.

both ears are affected in the same way, and suffer simultaneously from a high degree of difficulty of hearing; or, when the second ear, the tympanic membrane of which is not diseased, yet suffers from difficulty of hearing so incurable, that perforation of the membrana tympani affords the only prospect of probable improvement. To this permission for the performance of the operation, I must, however, annex the following clause; that the most careful investigation of the ear to be operated on, must have proved that it is suffering from no other morbid condition, by which the success of the operation would be rendered fruitless.

It is by no means a needless labour, thus accurately to define the indications for the operation; for so mechanical an invasion of the organic integrity of the membrana tympani, enfeebles its power of opposing injurious influences from without, and even exposes the interior of the ear, the cavity of the tympanum, &c., to the weather, and other external noxious causes.

Sir A. Cooper (*m*) imagined that perforation of the membrana tympani was indicated especially in cases where the Eustachian tube was closed, and where the cavity of the tympanum was filled with extravasated blood. But as he appears to have had no knowledge of catheterism of the Eustachian tube, even his diagnosis of its closure was doubtful, and not to be depended on; *e. g.* that the patient does not feel the sudden entrance of the air into the ear on expiring forcibly with the mouth and nose closed, the absence of any tinnitus, and other similar circumstances. Assuming, however, that closure of the Eustachian tube and extravasation of blood in the tympanum really existed, these morbid conditions would be much more certainly and successfully treated by catheterism of the Eustachian tube, than by perforation of the membrana tympani, especially as the latter does not remedy the morbid condition of the Eustachian tube, or does so in a mode which endangers the integrity of the

(*m*) Philos. Trans., 1801.

whole organ, viz. by allowing powerful water douches to be thrown into the meatus, and against the membrana tympani.

The results of his operation, in several cases, which Sir A. Cooper relates, ought not, on account of the defective diagnosis, and also from the indefinite mode of characterising the respective cases, to lead to any favourable conclusion whatever respecting the operation, but must of themselves remain uncertain, and at all events can be made more valuable and useful, only by repeated experience and better diagnosticated cases. It is precisely such experience which is wanting here.

With respect to the indications for the operation, Curtis (*n*) implicitly follows his renowned countryman, but betrays the same deficiencies in accomplishing his object as Cooper does; for most assuredly Curtis never introduced a catheter into the Eustachian tube. Closure of the Eustachian tube is the only indication which even Himly (*o*) can see, for perforation of the membrana tympani; in thickening of the membrane itself, he anticipates no good from the operation. But as he evidently has had no experience on the subject, his views, as dependent on purely uncertain theoretical considerations, can be of no importance.

Itard (*p*) maintains the same erroneous opinions as his predecessors, respecting the indications for the operation; and though he expresses himself somewhat more definitely than they have done, by making the operation dependent on an invincible obstruction of the Eustachian tube, yet he again fails in ascertaining whether the obstruction be really such as does not admit of removal. The single case in which Itard was induced to puncture the membrana tympani, simply on account of thickening of the membrane, is the only one in which the operation afforded any good results, to incite to imitation in similar cases.

Saissy (*q*) recommends perforation of the membrana

(*n*) Cases illustrative, &c.; Essay on the Deaf and Dumb.

(*o*) Comment. Gotting., vol. xvi. p. 107. (*p*) Traité, ii. pp. 200 and 158.

(*q*) Essai sur les Mal., &c., p. 70.

ni, only in cases where it is hardened and thickened. ver once troubles himself about the Eustachian tube rity of the tympanum throughout the essay; and the ase in which he professes to have successfully per- d the operation is related so incidentally, that it is not s least scientific value.

eau (*r*) has dilated at great length on the operation in on, and has declared that it may be resorted to with tage, in thickened states of the membrana tympani, structions and obliterations of the Eustachian tube, ı obstructions of the cavity of the tympanum. He says, that slight obstructions of the Eustachian tube, admit of being removed by injections alone, when ring in children below twelve years of age, who would bmit to such injections, require the membrana tym- o be perforated. These opinions, published in 1832, u has probably materially modified since, particularly ards the last mentioned, and indeed the weakest point; ı all his later writings he lays particular stress on g performed catheterism of the Eustachian tube, even ldren of six years of age. But on the other points, s nowhere retracted or corrected anything, so that he be considered as defending all that has been just cited. dications are evidently as little to the point, and as sfactory, as were those of Cooper, Curtis, Himly, or ; and the cases, of which he gives a tolerable list, ually unsatisfactory. These amount to twenty-five in er, but in all of them we look in vain for any exami- ı of the Eustachian tube, and he must, therefore, have deprived of the most necessary, nay indispensable t into its condition; nor did he think of instituting nly proper direct mode of treatment of this canal, ose obstruction he guessed. It is in entire accordance a diagnosis so uncertain, that Deleau obtained no d permanent success in any of the twenty-five cases ich he operated. The concluding cases detailed by

(*r*) Mem. sur la Perforation, &c. p. 29.

him from number 26—31, denote merely inflammatory states of the membrana tympani, which were treated and cured in the usual way, but which have nothing to do with the question of puncturing the membrana tympani.

By all other authors, who have considered the subject, either theoretically or practically, perforation of the membrana tympani has been treated of with equal superficialness; so that I must repeat, that with the exception of the single successful case recorded by Itard, no other is known in which the operator was on good grounds induced to puncture the membrana tympani; and that the thickening of this membrane, unaccompanied by any other disease of the ear, invariably affords the only true indication for its perforation. It was extremely to be regretted, therefore, that the interest at first excited by this operation, degenerated into a complete mania, and that it should have been attempted to make it a general efficacious remedy for deafness of all kinds, even for deaf-dumbness; the operation was thus so much the sooner brought into that discredit, which, with very few exceptions, it completely merits. But if, in these very few cases, which form the exceptions, and which should be carefully diagnosticated, the operation is to be performed, such a mode of operating should be selected, as may ensure the complete removal of a portion of the membrana tympani.

Cooper's method of perforating the membrana tympani with a trochar; that of Itard, who made use of a stilet of tortoise-shell; and that of Saissy, who also employed the trochar, are all to be rejected; for all the artifices of bougies of catgut, or lead, cannot prevent the opening, thus made in the membrana tympani, from again closing. With this closure all success vanishes, as it depends on the permanence of the opening. Himly's punch, constructed so as to suit the delicate texture of the membrana tympani, is a better instrument. Itard and Deleau are afraid (but without cause) lest by the pressure of this instrument, the membrana tympani should rather be detached from the

bony ring of the meatus, than a portion of it be thus removed. But the instrument may be made very sharp, and then it never fails to remove a round portion of membrane, (especially if, on applying the instrument, a rotatory motion be given to it,) and thus an opening is made, which does not again close. A steady hand and a sharp eye facilitate and ensure the success of the operation.

The quadrangular perforator of Buchanan appears to me perfectly useless; it does not allow of drilling the membrana tympani, but must be thrust right through it. A quadrangular opening may close even more readily than one that is round. If, however, the thickened membrana tympani is of cartilaginous hardness, even Himly's punch is useless; it would render too forcible pressure necessary, and the result, in all probability, would justify the apprehensions of Itard. An instrument which Deleau (*s*) has invented, is much better adapted for these cases. The essential part of this instrument consists of a fine steel rod, three inches long, and furnished with a very sharp point and two cutting edges; one from above, forwards, and the other from below, backwards. Each of these edges is hook-shaped, rising obliquely from before backwards, and by their union, form together an irregular worm of a screw, one line in length, with a very sharp point, which greatly facilitates the introduction of the instrument into the membrana tympani. Both edges are made to enter as a drill, and being slightly rotated back again on being drawn out, their incision is attended by a loss of substance of the membrana tympani. The disposition of the two cutting barbs seems to be very well adapted to the purpose; but of this my own experience has not as yet afforded me any confirmation. Deleau has, however, attached to this cutting part of the instrument, a very unnecessary, complicated, mechanical apparatus, the description of which would be tedious, and without the drawing, which I am not disposed to give, quite unintelligible. This mechanical

(*s*) Annales de l'Industrie, 1823, t. xii. p. 157, et seq.

addition, according to Deleau, is to render the operation more safe, and to supersede, by the mechanism, the movements of the hand of the operator. But the principle applies here, as to all surgical instruments, that the simpler they are, the more safe they are; the more the success of the operation depends on the skilful hand of the operator, the more certainly may such success be expected. The mechanical part of Deleau's instrument is, however, also for this reason to be rejected; because from the room which it occupies when introduced into the meatus, the membrana tympani, which is to be operated on, cannot be seen, in consequence of the instrument. The operation when thus performed, is therefore done, as it were, in the dark, and at random, on any part of the tympanic membrane; instead of the anterior or posterior inferior third of the membrane being carefully perforated with the instrument. If an opportunity presented itself, I should, therefore, make use only of the cutting part of the instrument, applying it to the membrana tympani with the naked hand, and, in all probability, should thus most certainly attain the object of the operation.

In consequence of the tediousness attendant on the application of so complicated an instrument, Deleau is farther obliged to fasten the patient's head to a strong stool furnished with cushions, and pass a strap over the head, in order to fix it, whilst the operator draws the strap tight, by placing it under his foot. A procedure so troublesome, is of itself enough to induce us to abandon the instrument; especially since even the utmost force is not sufficient to prevent some motion of the head, the least degree of which, in this operation, and with so complicated an instrument, is exceedingly disturbing.

It is always the safest to operate with a simple instrument, that can be easily made to follow the movements of the patient. For this purpose, I place the patient on a common stool, near the window, with the ear to be operated on directed towards the bright sunshine. The operator places

himself before or behind the patient, as may be most convenient, inclining the head of the patient towards the opposite shoulder, as far as the altitude of the sun may render it necessary, in order to allow the rays of light to fall directly on the membrana tympani. The speculum is introduced with the left hand into the meatus, and the punch steadily and carefully conducted to the anterior and inferior third of the membrane, and then passed through with a gentle rotatory motion. When the membrana tympani is only slightly thickened, that is, without cartilaginous degeneration, it readily yields to the pressure of the instrument, and a hand whose sense of touch is delicate, distinctly perceives when the opposition of the membrane is overcome. A drop of blood flows from the small wound; and occasionally the patient feels languid, and disposed to faint. Should a puriform mucus flow from the opening, and a similar matter be remarked on the punch, the cavity of the tympanum is diseased, and the affected ear cannot be expected to derive any benefit from the operation. In this case, either the diagnosis has been incorrect, or the operation has been undertaken on false grounds.

Should the punch not pass through the membrana tympani, and should it meet with invincible resistance, in consequence of the cartilaginous hardness of the membrane, the pressure of the instrument is not to be forcibly increased, but, for this, Deleau's instrument, already described, should be substituted, (merely the cutting part of this, however,) which should be passed through the membrane, in the same way as the punch, and withdrawn with a gentle rotatory motion.

It is unnecessary to introduce catgut bougies, or the like, after operating, either with Deleau's instrument or the punch. The aperture keeps open of itself. But, should the membrana tympani suffer from inflammation, this must be remedied by the application of leeches behind the ear, and by dropping into the ear a solution of acetate of lead.

Immediately after the operation, its success is as complete as it ever can be.

Case XXVI. Paul H——, æt. five years, lively, and of a robust constitution, had for eight days been confined to his room, when, on the 2nd of April, the weather being windy, he went out into the yard for the first time. A few hours after, he complained of pains in the throat, difficulty of deglutition, and subsequently of deep pains in the right ear, (unattended by tinnitus,) which became very violent and lasted for about five hours, when, on the breaking out of copious perspiration, they were considerably alleviated.

On the morning of the 3rd, the pains had entirely ceased, the meatus was clean, the membrana tympani had a granulated appearance, resembling the surface of a strawberry, was opaque, throughout two thirds of its surface of a red colour, and thickened. The left ear was sound. I simply ordered warm oil of sweet almonds to be dropped in.

In the evening, the pains in the ear returned, though not of so violent a character as the day before. They were, however, sufficiently violent to keep the child awake for an hour during the night, till free perspiration again occurred.

On the 4th, a blister was applied beneath the mastoid process; the pains did not again return in the evening.

On the 5th, the membrana tympani was white, but large red blood-vessels ran along the handle of the malleus. The blister was kept open, and cotton wool worn in the ear.

On the 18th, the membrana tympani had again acquired its transparency and polish, the secretion of cerumen had returned, and the hearing, the disturbance of which could not be accurately determined in so young a child, was again completely free, so that the treatment was considered as terminated.

Case XXVII. Mr. Ippel, of this city, on the 10th of October, felt suddenly, deep in the left ear, burning pains, confined entirely to the ear, accompanied with a sensation as though a knife were turned rapidly round in the ear. Warm oil of sweet almonds dropped into the ear, and the application of a warm oatmeal poultice, diminished the

pains but slightly. In the evening, violent fever came on, and the night was passed without sleep.

On the 11th, I found the left meatus dry, wide, and without redness; the membrana tympani yellowish, streaked with a great many very red blood-vessels, passing from above downwards, and evidently so swollen that it seemed to be pushed farther forwards into the meatus; it was opaque; and the pains were as violent as yesterday. The patient complained of a sensation in the ear, which he described as resembling the continued movements of a fly. My watch was now heard only at a distance of one foot by this ear. The right ear was perfectly sound. Ten leeches were applied behind the diseased ear, warm oil of sweet almonds was dropped into it, emollient poultices were kept constantly applied, and an infusion of senna was given, which acted well on the bowels. The pains in the ear had almost entirely ceased in the evening; the fever was much moderated; and the patient slept tolerably during the night.

On the 12th, there was no pain, but merely a sense of heaviness and fulness in the ear, with a gentle rushing noise, so that my watch was not heard beyond the distance of one inch. The membrana tympani appeared still more yellow, whilst the blood-vessels had become smaller, and far less numerous. The meatus continued sound. In consequence of gastric derangement, it was necessary to give an emetic in the evening. The fever ceased, the poultices were omitted, but the oil of sweet almonds was still dropped into the ear.

On the 13th, no alteration. Up to the 18th, the tumefaction of the membrana tympani entirely vanished. The constant sense of fulness in the ear was such, that the patient heard the watch only when placed in contact with the ear. Some cerumen made its appearance. A weak solution of lead was dropped into the ear.

On the 29th, the rushing noise had entirely ceased, and there were no longer any blood-vessels to be seen on the membrana tympani. The hearing distance amounted to

four inches, in spite of the annoying sense of weight in the ear, which probably depended on an exfoliation detaching itself from the membrana tympani. I simply ordered warm water to be poured in; and on the 5th of November, syringed several broad yellow scales out of the ear, that had become detached, partly from the membrana tympani, (which now appeared white, though opaque,) and partly from the meatus, which also desquamated. The diseased ear could hear the watch at the distance of eighteen inches.

All the complaints were now removed, and the Eustachian tube free. The restoration of the membrana tympani was obliged to be left to the curative powers of nature, on the influence of which, in removing the opacity and thickening of the membrane, the farther improvement of the hearing depends.

§ 2. *Chronic Inflammation of the Membrana Tympani.*

This form of disease occurs, either unaccompanied by any sensation, or by tickling and a slight pricking, tearing pain in the bottom of the meatus, occasionally extending across the temple to the vertex: or, after an acute febrile inflammatory state, with sleepless nights, it is preceded by very acute pains in the ear, which either entirely disappear, or at least become much milder, (being somewhat augmented from time to time,) and continue as a chronic affection for months and years.

On examination, the membrana tympani is observed to be reddened, either partially or throughout its whole surface, the colour exhibiting every shade of red, from a bright pale to a deep brown red. Striking alterations in the texture of the membrane are also observed. It appears opaque, thickened, uneven, and swollen, so that generally the long process of the malleus, and even the natural navel-like depression of the membrane cannot be seen. On this inflamed reddened surface there may frequently be observed granulations of various sizes, and either of a pale or blood-

red colour; sometimes very soft, sensitive, and bleeding readily; at other times, of cartilaginous hardness, insensible, and not bleeding; situated sometimes on the centre, and sometimes on the circumference of the membrane; at other times, covering its whole surface.

Most frequently, however, one or more openings are observed, (generally close before or underneath the handle of the malleus, seldom behind it,) which vary much in size, from that of a pin's point to a split pea, or are even so large as to have destroyed two thirds of the whole of the membrana tympani; in the latter case, the mucous membrane of the cavity of the tympanum is exposed to view. The Eustachian tube is, without exception, always free, when the membrana tympani is perforated; so that, if the patient expire forcibly, at the same time closing the nose and mouth, the air escapes through the opening in the membrane with a whizzing noise; but should this not be the case, in consequence of an unusual accumulation of mucus in the cavity of the tympanum, a more forcible stream of air from the air-press will certainly obtain exit by the same way. With these organic alterations of the membrana tympani, there is always associated a morbid secretion of a muco-purulent character, the quantity and quality of which are always very different at different times, in the same cases, without any definite and constant relation existing between this and the organic alterations of the membrana tympani.

The secretion may be copious, and become a real discharge, especially if polypi exist at the same time; or it may be so scanty as to escape the notice of the patient, or of a superficial observer; whilst at the same time the membrana tympani and the walls of the meatus are covered with foul, greenish-yellow, dry crusts. It may be watery, white, mucous, or greenish-yellow, brownish, mixed with bloody streaks, bland or corrosive, void of smell, or very fœtid and of a disagreeable ammoniacal odour. Its quantity is often augmented by a simultaneous affection of the mucous membrane of the cavity of the tympanum. There is a total

absence of cerumen as long as the morbid secretion from the membrana tympani and the adjoining parts continues.

Dulness of hearing is an inseparable attendant on the present disease, though the degree of this is indeed very various; nor does this again stand in any constant determinate relation to the structural alterations of the membrana tympani, such as thickening or perforation. We often find the hearing very tolerable, even when there is considerable loss of substance of the membrana tympani, and *vice versâ;* the reason of which depends on the absence or simultaneous existence of some affection of the cavity of the tympanum, and of those portions of the membrane which still remain. The more thoroughly the meatus and the cavity of the tympanum are cleansed of mucus and pus, by means of injections of water and of air, the more free is the hearing, though this freedom is often only transitory.

Tinnitus is here altogether a non-essential and inconstant symptom; it is much more frequently entirely absent, even through the whole course of the disease, than the subject of complaint. It is particularly rare when the membrana tympani is perforated.

The meatus is usually perfectly sound, proving indisputably that chronic inflammation of the membrana tympani is an idiopathic, independent affection, the chronic character of which, from the mild and latent form of its development, as well as from its duration of many years, viewed in connection with the evident organic alterations of the membrana tympani, cannot for a moment be mistaken.

The diagnosis may always be established, by syringing out the meatus perfectly clean; investigating it by the aid of the speculum in bright sunshine; and testing with the probe the sensibility or insensibility of the thickened membrana tympani, and of the polypous excrescences which cover it. Should the perforation of the membrane not be evident, and therefore doubtful, the patient should first endeavour to inflate the cavity of the tympanum, by making an effort to blow the nose, with the mouth and nostrils closed. If the

air does not then pass through and out of the meatus with a whizzing noise, a stream of air should be directed into the cavity of the tympanum, from the air-press, by means of a catheter, in the manner hereafter to be described, which will certainly pass up to the membrana tympani, and through the meatus.

Chronic inflammation of the membrana tympani, when left to itself, lasts for many years, or, more correctly speaking, continues during the whole life-time of the patient, for nature neither makes, nor indeed can make, any effort for its cure. It more frequently happens that both ears are affected with the disease, than that either of them is exempt.

In many instances, it is quite impossible to say what are the circumstances which have given origin to the disease. In other cases, however, it is immediately connected with acute and chronic cutaneous diseases, especially with scarlatina, the tendency of which to develop metastatic inflammatory affections of the membranous structures of various organs, unfortunately does not spare the membrana tympani, and is especially apt to give rise to perforation and to polypous growths. Small-pox, measles, nettle-rash, and scald-head, act in an equally decided injurious manner, though less frequently. Other patients merely attribute their malady to cold, the action of which is particularly liable to produce relapses, and to increase chronic inflammation already existing.

The prognosis is in general altogether unfavourable; it is only under particular circumstances, and occasionally under such only the peculiarity of which we cannot at all define, that it becomes in some measure more favourable.

The slight degree of pain with which, in more favourable cases, the chronic inflammation of the membrana tympani makes its invasion, in some measure explains the negligence with which the disease is treated by the patients, and even by their medical attendants; whilst, in other cases, where pain is altogether absent, this neglect cannot be at all charged to the patients, as they (when there is also complete absence

of any discharge) have scarcely any conception of the existence of their malady. Thus it happens, that by far the greater number of these patients do not seek for assistance till the disease has existed for many years; often not till it has become incurable from disorganisation of the membrana tympani, or when their groundless confidence in the curative powers of nature, has been proved to be idle and deceitful. But unfortunately, even then, the patients often do not obtain the proper assistance which they seek. The necessary information is never once imparted to them that their disease is incurable, and that any curative attempt, occasionally shattering the whole constitution, is a fruitless undertaking. The membrana tympani is not examined; the most acrid, spirituous, ætherous, or oleaginous fluids are fearlessly applied to the inflamed and perforated membrana tympani; and not only is the strength of the patient destroyed in the most unjustifiable way, by electricity, galvanism, debilitating setons, issues, and powerful Russian vapour baths, and the hopes that had been raised most cruelly destroyed by the failure of success; but even the topical affection is positively aggravated. When persons devoid of all scientific medical education, think to cure dulness of hearing, depending on perforation of the membrana tympani, by the strokes of a mineral magnet, (as was attempted in my presence by Mr. Bahrdt, in the case of Madlle. Markstein,) we need not be surprised. We cannot, however, but be filled with the deepest regret, when equally gross carelessness in the investigation of the seat of the disease, and in the treatment of such patients, is met with in physicians in other respects distinguished. I cannot abstain from briefly mentioning here an example of this kind, which came under my own observation within the last few days.

The son of M. Lorich, of Stockholm, æt. twelve, and well formed, had the scarlet fever when four years of age, and from that time was affected with considerable dulness of hearing. His father took him to Copenhagen, to that justly

celebrated practitioner, Dr. Bang, who, without instituting any examination of the ear, declared the child's affection to be of a scrofulous character, and accordingly prescribed a most energetic internal treatment, for the purpose of eradicating the latent scrofulous taint. Tincture of myrrh was to be dropped into the ear from which there was a discharge, and strong tartar emetic ointment rubbed in behind the ear. With this advice, the father came directly from Copenhagen to me. I found, in both ears, *a considerable perforation of the membrana tympani, and on the left membrana tympani, in addition, a flat, very deeply seated polypus. The child was in other respects healthy.* The treatment prescribed, besides its very injurious influence on the child's general health, could not in the most remote manner affect the *incurable* topical affection; the tincture of myrrh must have augmented the chronic inflammatory condition of the membrana tympani, and produced still greater loss of its substance, and was as little capable as the painful tartar emetic ointment, of removing the polypus.

How often have I seen that patients whose membrana tympani was seriously injured, had been ordered Russian vapour baths for the cure of the attendant dulness of hearing! It would be an interminable task to enumerate all the absurdities that have fallen under my notice in the treatment of this morbid condition of the ear, which has hitherto almost always been mistaken.

If the disease be attacked during the period of its first development, we may confidently reckon on effecting a radical cure, and preventing all the consequences to which it gives rise. But if the malady has already existed for a long time, then even after the removal of all inflammatory symptoms, there will certainly remain as incurable sequelæ, at least opacity and thickening of the membrana tympani, the injurious influence of which on the function of hearing cannot at all be estimated.

When, however, the membrana tympani is already perforated, there remains nothing more to be done, but by

the removal of the attendant chronic inflammation, to arrest the farther progress of the destructive process. To polypi of the membrana tympani the same observations apply, as those which have been made farther back, respecting similar growths, which are the result of acute inflammation of the same part. When the membrane is perforated, the best treatment very often does not succeed in removing the morbid secretion—the otorrhœa; for the mucous membrane of the cavity of the tympanum remains exposed to the atmospheric air, the unnatural irritation of which must almost necessarily keep up a permanently altered secretion of mucus, both as regards its quantity and its quality.

There is no reason to fear an extension of the inflammatory condition to other parts of the organ, *e. g.* to the periosteum, even though there may be the greatest neglect on the part of the patient. It is only when acrid, irritating substances are made use of in the topical treatment, that suppuration of the cavity of the tympanum is to be dreaded, unless the patients are induced to abandon in good time so unsuitable a plan of treatment, in consequence of the increasing dulness of hearing and the pain which is excited.

Cleanliness is of the utmost importance in the treatment of the disease; the ear must be daily syringed out with tepid water, and this should be repeated even several times, according to the quantity of the puriform matter secreted. In consequence of the curvature of the auditory canal, this is no trivial affair. A dexterous patient can often accomplish this best himself; and better than his too cautious friends. Without thoroughly cleansing the auditory passage, especially the bottom of it, from all adherent mucus, the remedies to be applied can effect nothing.

In chronic inflammation of the membrana tympani, whether with or without perforation of the membrane, I use with the most marked advantage a solution of acetate of lead, cold or tepid, dropped into the ear twice or three times a day. The strength of the preparation of lead may be increased according to circumstances, from gr. i. to gr. x.

to the ounce of water; in which last case, the membrana tympani is covered with the fine powder of the salt, and its action kept up so much the longer. If the inflammatory excitement extend even to the parietes of the meatus, or should it manifest particular obstinacy, if the mucous secretion become copious, and if the patient be very plethoric, besides the use of the drops, saline purgatives and a spare watery diet should be had recourse to, and suppuration established beneath the mastoid process, by rubbing in tartar emetic ointment. Leeches are quite useless.

Instead of the salt of lead, solutions of nitrate of silver, sulphate of zinc, alum, &c., have been recommended; but in the trials that I have made of these substances for this purpose, (as well as of the pyroligneous acid, in the proportion of ʒj. to the ounce of water,) they have always caused irritable painful excitement of the meatus, when the solution made use of was strong, and when weaker, no effect at all was produced. The acetate of lead removes, in a singularly rapid and complete manner, the disagreeable ammoniacal odour of the discharge. There is no reason to imagine that by this remedy the inflammatory state will be suddenly and rashly suppressed, or transferred to the brain; I have even observed obstinate chronic head-aches relieved, in proportion as the acetate of lead overcame the increased vascular action of the membrana tympani and the surrounding parts.

By the plan here recommended, the membrana tympani becomes white; the secretion, and any tinnitus that may exist, diminish, and are finally completely removed; and the hearing improved. Opacity and thickening of the membrana tympani ought not to induce us to make useless curative attempts. In the latter case, perforation may, indeed, be had recourse to; but let the difficulties attendant on the operation, which have already been mentioned, and which always render its success extremely doubtful, be first considered. The mode of operating has been already described. When the membrana tympani is perforated,

the patient should guard the cavity of the tympanum from the injurious action of cold wet weather, as well as from dust, by means of cotton wool or charpie worn in the ear.

Polypi of the membrana tympani, even when pedunculated, present the greatest difficulties to the operator; and with regard to the farther treatment of these organic products, I may merely refer to what has already been said (*t*).

Case XXVIII. Caroline Prévot, æt. twenty-six years, has suffered for two years, as the result of violent cold, from a discharge from both ears, accompanied with severe pains. In general, towards evening, and especially during stormy weather, violent tickling, tearing, and dragging in both meatus occur, accompanied by tearing pains in the head, and an irresistible impulse to scratch in the ears, till they become very hot and red. If at length she falls asleep, the same scene again recurs in the morning, though less severe. Of her own accord she has kept up free suppuration for six weeks, from behind both ears, by means of blisters, but without any advantage. I found both meatus sound; the *left* mem-

(*t*) To the cases detailed by the author, in elucidation of chronic inflammation of the membrana tympani, I have added an exceedingly interesting and valuable one (Case XXXIX.), for which I am indebted to my friend, Mr. Ebenezer Smith, of Billiter Square. This case certainly shows, that perforation of the membrana tympani is not altogether so irremediable as represented by Dr. Kramer; and though no ultimate success attended the treatment that was adopted, the complete restoration which was effected, of a large portion of the membrana tympani that had been destroyed by ulceration, is calculated to induce us not to consider all curative efforts in these cases as utterly vain. Whatever may be the opinion entertained as to the propriety of resorting to mercury in similar cases, all who may have the pleasure of being acquainted with Mr. Smith, will feel that the high character of the observer, private as well as professional, demands that the greatest confidence should be placed in his communication. The accuracy of the diagnosis in Mr. Smith's case, from his having availed himself of the important aid afforded by catheterism of the Eustachian tube and careful ocular investigation, gives to his communication a character very different from that which, unfortunately, belongs to most of those relating to acoustic medicine, that are to be met with in our literature. (Tr.)

brana tympani opaque, white, with small red spots, and a slight puriform secretion. The hearing distance on this side was eight inches. The antero-superior half of the *right* membrana tympani, was of a dark red colour, thickened, and covered with a dirty-brown matter; the portion which still continued white, was opaque. The hearing distance on this side was fifteen inches. The secretion increased during stormy weather, when susurrus also occurred, though this was but transitory. I ordered a solution of acetate of lead (gr. viij. ad ℥ij. aquæ,) to be dropped into the ears, and in fourteen days subsequently, all redness had disappeared from both membranæ tympani. Fourteen days after this, all secretion and tickling in the ears had entirely ceased; the hearing distance increased to two feet on the left side, and to fifteen on the right.

Some months subsequently, attended by very violent pains, first the right, and afterwards the left meatus swelled to such a degree as to be almost entirely closed; they were of a pale red colour, and secreted a scanty thickish fluid. I now employed besides the above solution of lead, strong tartar emetic ointment, which was rubbed in behind both ears. By these means, in the course of twelve days, the inflammation was completely removed, the natural width and colour of the meatus and of the membrana tympani, together with the hearing distance above stated, were again restored. Complete restoration of the normal condition she will not acquire, so long as the thickening of the membrana tympani lasts.

Case XXIX. Miss Trepplin, from early youth, has suffered from a purulent offensive discharge from both ears, attended by considerable difficulty of hearing, and constant loud whizzing and humming before the ears. The origin of these complaints is entirely unknown. Previous curative attempts with drops, consisting of acrid oils, and blisters, have proved of no advantage. Both meatus secreted a thick, cheesy, fœtid, scanty matter; on the left side, the

posterior fourth was rough, and the antero-superior part of the membrana tympani of a dark red colour; the hearing distance was nine inches. On the right side, the membrana tympani was converted into a smooth, dark red, and horny-looking protuberance, in which there was no vestige of the insertion of the handle of the malleus to be seen; the hearing distance amounted to only one inch. Both Eustachian tubes were open and free. The patient was, in other respects, in perfect health.

I ventured, therefore, to confine myself to a purely topical treatment of the ears, and ordered a solution of acetate of lead to be dropped into both ears. By this means, within fourteen days, the odour of the secretion and the redness of the left membrana tympani were entirely lost, whilst that of the right membrane was much diminished. After the treatment had been continued for six weeks, the left membrana tympani was perfectly clean, white, and dry; the hearing distance four feet. The membrane of the right side, on the contrary, was still covered with a trifling secretion, and the hearing distance unaltered, which, from the serious structural changes of this membrane, is not surprising. The buzzing in the ears was much diminished.

A few weeks later, the hearing distance on the right side had increased to five feet; the membrana tympani, with the exception of being opaque, presenting a perfectly healthy appearance. The left membrana tympani was also white, excepting at the anterior part, where there was a red spot of the size of a lentil seed, of a granular appearance; there was no secretion, but it was perfectly opaque. Some appearance of the navel-shaped depression could be detected, as well as the point of the insertion of the handle of the malleus. The hearing distance amounted to twelve inches. The buzzing was now extremely feeble. Finally, a few weeks subsequently, as the red spot had also disappeared, the treatment, which had consisted solely of the use of the acetate of lead, was terminated.

CASE XXX. Mr. Lindemann, a teacher, of this city, has suffered since ten years of age, as the result of repeated colds, attended by violent otalgia, from a puriform otorrhœa with considerable difficulty of hearing, but without tinnitus. Topical remedies, consisting of acrid injections, hot fomentations, and similar things, had been ordered by Dr. Lasch, of this place, in ignorance of the peculiar morbid condition, and had, in every sense, aggravated the malady.

I found both meatus sound, partially filled with a matter free from any offensive odour, the tympanic membrane of a pale red colour, without its depression, thickened, and opaque; anterior to the point of insertion of the malleus, there was an evident perforation, of the size of a pin's head. The hearing distance on the left side was four inches, and on the right five inches. The hearing, however, was always better after impelling air into the ears by forced expirations, shewing that there was also mucous secretion and accumulation in the cavity of the tympanum.

I ordered a solution of acetate of lead to be injected into the ears thrice a day. After the treatment had been continued for four weeks, both meatus were dry, and the membrana tympani white, though still opaque. The hearing distance on the left side remained unaltered, but on the right side it amounted to two feet, which greatly facilitated the patient's discharge of his duties as a teacher.

CASE XXXI. Mr. Köhler, thirty-four years of age, has, for a long time, suffered from difficulty of hearing of the left ear. Twelve days ago, he took cold, which produced violent pricking pains in the right ear, that prevented him from sleeping for four successive nights. During the day, he was free from pain. Six leeches, a blister, and purgatives had only afforded him very temporary alleviation. The right meatus was filled with a white mucous secretion, and, near the membrana tympani, so red and swollen, that the periphery of the membrane was quite concealed. The visible portion of the membrane was of a pale red co-

lour, and perforated; so that when the patient expired, with the mouth and nostrils closed, the air passed with a whizzing noise out of the ear. The severe pricking pains in the ear recurred every night. My watch was heard, by this ear, at the distance of three inches. A continual rattling noise, before the ear, very much disturbed the patient. The left ear manifested nothing of a similar morbid state.

In the first place, I syringed out the meatus with pure water, which not only removed the tinnitus and all pain, but also increased the hearing distance to two feet. The patient then made use of a solution of acetate of lead as an injection for the right ear, and rubbed in tartar emetic ointment behind the ear. The pricking pains returned the following night, shooting through the temple to the vertex, but did not recur again. After using the above remedies for fourteen days, all the morbid phenomena, excepting the perforation, disappeared from the right ear, so that the treatment was considered (as indeed it was necessary to consider it) as terminated. The hearing distance had increased to three feet.

Case XXXII. Mr. Oehlmann, of Cöthen, nineteen years of age, has suffered, from his early youth, without being able to assign any cause for it, from purulent secretion in both ears, with difficulty of hearing; which, whenever he takes cold, is increased, being attended with severe otalgia.

All sorts of acrid drops, fomentations, &c., had been employed, and he had even undergone a course of homœopathic treatment for a whole year, under the direction of Hahnemann himself, without deriving any benefit.

I found both meatus open and wide, free from any morbid alteration. On the left side there was a moderate quantity of thick yellow secretion; the membrana tympani was red, swollen, and uneven; and its anterior half perforated by an opening of the size of a lentil seed; there was no tinnitus, and the hearing distance was fourteen inches. On the

right side there was very little secretion, and little redness of the membrana tympani, the posterior half of which was perforated by an opening of the size of a pea, so that the reddened mucous membrane of the cavity of the tympanum could be distinctly seen. There was no tinnitus, and the hearing distance was two feet. I simply gave the patient a solution of acetate of lead, containing ten grains to two ounces of water, as an injection for both ears, and ordered this remedy to be persevered in for three months. After this period all redness had disappeared from both membranæ tympani, and every vestige of secretion, so that the hearing distance of both ears had increased to four feet. The treatment could now be justly considered as terminated; for with such extensive loss of substance of the membrana tympani of each side, so important an improvement of the faculty of hearing could certainly never have been anticipated.

Case XXXIII. Caroline Gültzow, of Zehdenick, twenty-two years of age, very healthy and strong, three years ago, without any distinct cause, was attacked with pains in the ear of so violent a character, that for several nights she could not remain in bed. The pains ceased spontaneously, but left behind a permanent otorrhœa, accompanied by considerable difficulty of hearing. I found both meatus wide and sound, with but trifling purulent secretion, having a very faint smell. On the left side, the antero-inferior portion of the membrana tympani was of a rose-red colour, opaque, and perforated by an opening of the size of a pin's head; the hearing distance was eighteen inches. On the right side, there were small rose-red excrescences on the posterior wall of the meatus, close to the membrana tympani, which was opaque, and its antero-inferior half of a very red colour; the hearing distance was eight inches. There was here also a perforation which could not be mistaken. Susurrus occurred only now and then, resembling the noise of water from a mill-wheel, and principally in the

right ear. Tartar emetic ointment was rubbed in behind the right and the left ear alternately, till suppuration commenced. A solution of acetate of lead was injected, and in consequence of a great tendency to constipation, a purgative was taken occasionally. After three months, the membrana tympani, on both sides, was white, though still opaque, but free from any mucous secretion; the hearing distance on the right side was four feet, and on the left side six, without any susurrus. In the course of the following summer, the patient was actively employed in field labour, but did not experience the smallest change in the condition of her ears, which had been so very much improved.

Case XXXIV. Retzlaff, a domestic servant, a strong healthy man, forty-one years of age. His hearing on the left side had, for some time, been very obtuse, in consequence of a blow. He was attacked, probably after taking cold, with severe pains in both ears, with a discharge of blood and pus, susurrus, and difficulty of hearing of the right ear, hitherto sound. The pains continued for nearly a month, at length ceased, but again returned with renewed violence, though without susurrus. I found in both ears, a large quantity of very offensive, dirty pus; the meatus wide and sound; but the membrana tympani of both sides, of a pale red colour, opaque, and perforated, so that on forcing air into the tympanum from the mouth, it passed out with a whizzing sound. There was no longer any susurrus. On the left side, the patient heard my watch only when placed in contact with the ear, and on the right side, at the distance of only one inch.

A blister was applied behind each ear, and a solution of acetate of lead, containing ten grains to two ounces of water, was poured into the ears. After using this remedy for fourteen days, the discharge diminished, and its odour was destroyed; the hearing distance on the right side amounted to twelve inches. Four weeks subsequently, there was no longer any secretion, nor any redness of the membrana tym-

pani to be observed. The same watch was heard by the right ear, at a distance of eight feet, which previously had been heard at a distance of only one inch. The hearing of the left ear was unchanged. With this the treatment was terminated.

Case XXXV. Mr. Alberti, eighteen years of age, very strongly built, when four years of age, was brought to the brink of the grave by scarlet fever. After this disease, he had ulcerated cervical glands, on the healing of which, a puriform discharge was observed, first from the left ear, and subsequently also from the right. Soon after this, a polypus was discovered in the left meatus, which, on two different occasions, was removed, but without preventing it from again sprouting for the third time. Both ears secreted a large quantity of thick, yellow matter, of an ammoniacal odour. The left meatus was completely filled by a globular polypus, that readily bled, whilst in the right there was a small, deeply seated polypus, which, from slight tumefaction of the meatus, had hitherto escaped notice. The right ear, alone, still heard my watch at a distance of two inches, by the left it was no longer heard at all. The membrana tympani was perforated on both sides. Repeated attempts, partly with the scissors, and partly with the knife, succeeded in destroying both polypi, with the exception of their roots. It was now manifest that, on the left side, no vestige remained of the membrana tympani, nor of the ossicula auditûs; whilst on the right side, the membrana tympani appeared to be still in a tolerable condition. I confined myself to the use of the acetate of lead, by the aid of which, within a few weeks, the secretion became inodorous, and almost entirely ceased. The hearing distance, on the right side, had increased from two to twenty inches, but the left ear, still, as previously, could not hear the watch at all.

Case XXXVI. Mr. Hegewald, sixty-one years of age,

of a vigorous frame, has suffered since he had continued fever, when twelve years of age, from a constant puriform discharge from both ears, accompanied by considerable difficulty of hearing, which for the last few years has compelled him to make use of Dunker's hearing tube. There has scarcely ever been any tinnitus. He no longer could hear my watch, even when placed in contact with the bones of the head. I found, in both ears, a small quantity of offensive, muco-purulent secretion, besides blood-red, globular excrescences, between which the air rushed with a whizzing noise, when the patient expired with the mouth and nose closed. The membrana tympani was therefore perforated.

I succeeded, in the first place, by the aid of the scissors, and a pair of small hooks, in destroying the polypus of the right ear, excepting a small portion of its root, which was seated at the anterior border of the membrana tympani, where the perforation of the membrane was manifest, close to the handle of the malleus. The whole surface of the membrane was of a rosy red colour. After the operation, the right ear heard my watch at a distance of three inches, and has maintained this degree of hearing ever since; in consequence of which, he has not only been enabled to dispense with the hearing tube, but, by great attention, he is so far able to compensate for his still feeble hearing, as to appear to hear well. The mucous secretion is still very trifling, and inodorous; and this, together with the reproductive power of the small polypous root, (which can no longer be reached with the lunar caustic,) is kept within limits by pouring in a solution of acetate of lead.

The polypus of the left ear is very deeply seated, and difficult of access with the lunar caustic; laudanum liquidum Sydenhami only favoured its growth; other caustic applications proved too painful; and the patient was so much satisfied with the state of his right ear, that he was contented to leave the polypus of the left ear untouched.

Case XXXVII.—Mr. Seiffert, a master builder, when

twelve years of age, had a severe attack of continued fever, since which time he has suffered from a running from the ears, tinnitus, and difficulty of hearing. Russian baths, the baths of Warmbrunn, and a seton, which he has worn for six months, have been employed in vain. There was an aqueous inodorous secretion in both ears, which till a year ago, had been copious, acrid, and stinking. Beneath the secretion, the membrana tympani was opaque, reddish, and the greater part of it covered with an even, palered excrescence, quite insensible on being touched with the probe. With the left ear he still heard the watch at a distance of one foot, and with the right, at a distance of half a foot.

The patient being, in other respects, in very good health, the treatment was purely topical, consisting of caustic applications. On commencing by the application of lunar caustic, very severe painful sensations were excited in the left ear, whilst the right was quite insensible, even to this chemical irritation, whence it was necessary to conclude that the polypus of this side was of a cartilaginous structure. The auditory power of this ear remained, therefore, just as it was, whilst that of the left, after six weeks, had increased to three feet.

In consequence of the weather becoming gloomy, the treatment was interrupted for fourteen days, during which time the polypi had grown so considerably, that the membrana tympani, on both sides, was completely covered; the hearing distance on the left side had fallen to one inch, whilst the watch was no longer heard at all by the right ear. The caustic was now applied again every other day, for four weeks, by which the auditory power of the left ear again rose to two feet; whilst that of the right side continued bad without any change, with a very annoying sense of fulness, loud buzzing, and vertigo. The hope of rendering the polypus less firm, by means of caustic potash, was not realised. As the improvement of the left ear became stationary, the caustic was once more applied, but after a few

weeks, the excrescence again covered the whole membrana tympani, under the form of a red, shining mass, over which the probe slipped, as over a polished stone, without exciting any pain. The vertigo continued for a long time, notwithstanding very spare diet, smart purging, and copious suppuration, induced by tartar emetic ointment, from behind both ears. The application of zincum muriaticum improved the hearing only for a time, so that when after having kept up the suppuration from behind the ears for four weeks, the vertigo ceased, it appeared to me most advisable to leave the polypi to nature. This state remained almost unaltered for a year, the head being confused and stupid. After this lapse of time, I renewed the suppurative action from behind the ears, scarified the polypi as deeply as possible, without, however, being able to make them bleed, and finally succeeded so far, that the cephalic pains entirely ceased, and the left ear again heard my watch, at a distance of at least four inches. From the peculiar cartilaginous structure of the polypi, it did not appear to me advisable to make any farther curative attempts, and the treatment was, therefore, terminated.

Case XXXVIII. Mr. Von Rudolphi, a healthy strong man, twenty-six years of age, having taken cold during an aquatic hunt, became very deaf of the right ear alone, without any tinnitus. I found chronic inflammation of the membrana tympani, and strictures in the Eustachian tube on this side. All my attempts, repeated daily for a week, to dilate these strictures by the introduction of catgut bougies, completely failed. The attendant difficulty of hearing remained unaltered, so that (though without any particular expectation of success) I was compelled to resolve on the last remedy for this form of disease,—perforation of the membrana tympani.

The operation was first accomplished by means of Itard's stilet, which, on piercing the membrane, gave to my hand the feeling as though it passed through a soft doughy mass.

A few drops of blood flowed out, and, for some hours afterwards, the patient felt languid, as though he were about to faint, without any painful sensation. The hearing was not at all improved, and, on examination the following day, during full bright sunshine, there was no trace to be found of the opening that had been made.

Eight days subsequently, the operation was, therefore, repeated, with one of Himly's sharp punches, which was passed through the posterior and inferior half of the membrana tympani. This also penetrated very readily, and, on being withdrawn, was streaked with a fluid, dark-yellow, puriform mucus, a small quantity of which was also removed by injections into the meatus. The patient was not, this time, attacked in the same way, after the operation, but there was not the slightest improvement in the hearing, the last hope for the restoration of which was, therefore, now lost. The aperture still remained open a few days afterwards, but from the permanent chronic inflammatory state of the middle ear, it must, necessarily, have closed subsequently. The departure of the patient prevented my verifying this.

[Case XXXIX. November, 1835, A. B. C., aged sixty-three, a gentleman of very spare person, abstemious habits, and indomitable in his literary and other studies, was seized twenty-nine years ago (being then thirty-three), with severe pain in the left ear, which was followed by a thick discharge and by considerable deafness. His father had been dull of hearing a few years before his death, at an advanced age; and the patient himself has been much disposed to catarrh. In the spring of 1833, his deafness rapidly increased. The Eustachian tubes appeared to be closed, and the left external auditory passage was dry and callous, from repeated old ulcerations having destroyed its follicular texture. In May, a bougie was passed up the left Eustachian tube, through the catheter, but the right tube resisted my efforts to open it, as well as those of a friend, who is an admirable

anatomist and aurist. Afterwards, the most gratifying improvement in the faculty of hearing succeeded the inflation of the left Eustachian tube, which the patient easily effected, by expiring forcibly with the mouth and nose closed. But this improvement, from inflation of the tympanum once or twice a day, slowly vanished, until, at length, it produced activity in the nerve, only for a few minutes. In the summer of 1835, my patient was attacked by continued fever, during which, and in the convalescence, his deafness was almost complete. On the subsidence of the inflammatory action of the brain, and as his strength was restored by country air, hearing was satisfactorily improved. In the following autumn, the meatus were frequently subject to superficial ulceration, which was cured by blisters to the mastoid process, and injections of tepid or astringent waters. At length, however, on Nov. 12th, this ulceration recurred, and on the left side spread inwards, till it effected an opening into the membrana tympani. In four days, one fourth of the whole membrane, at the antero-inferior segment, was eaten away; the membrana tympani looked dull, and very vascular around the handle of the malleus, as well as about its edge and the integuments; slight uneasiness in the tympanum was complained of. I verified this state of things by repeated examination, in a strong light, which was satisfactorily effected, in consequence of the great width and straight course of this gentleman's auditory passage. Together with this rapid destruction of the membrana tympani, the power of hearing as quickly diminished, until, in three days, the clearest and strongest sounds were, with difficulty, appreciated either by the naked ear, or by hearing tubes applied close to the source of sound. The right membrana tympani was entire; but the corresponding Eustachian tube continued closed, and the hearing on that side was gone.

As during the previous three months, the frequently recurring ulceration had been but temporarily relieved by astringents, &c., and the suggestions of the best informed

aurists in London had been ineffectually tried; considering, also, that the symptoms indicated chronic inflammation of the membrane and cavity of the tympanum, rather than any other pathological state; and more than all, since the deafness was becoming *complete* on the left side also, as the ulceration extended itself;—for these reasons, I determined to try the effect of mercury, hoping, (though, I confess, without a single precedent of a similar case,) that if my diagnosis was sound, the ravages of disease would be checked, and a new membrane might possibly be formed.

On Nov. 16th, 1835, I began by giving pilulæ hydrargyri gr. iij. cum extracti opii gr. ¼ every five hours, and applied a blister to the nape. In four days, sleeplessness and febrile irritation appeared. I therefore gave half the dose of mercury, and omitted the opium, which, on other occasions, had caused wakefulness. The blister healed in five days; and two days afterwards, the gums were sore, immediately upon which, the power of hearing improved, and I observed the edges of the ulcerated membrana tympani white, and approximating so as to narrow the aperture. In six weeks, *the ulcer was replaced by a delicate white membrane*, resembling the original membrane, except in apparent strength, *stretching across the entire site of the aperture.* I was also delighted to observe the power of hearing become equal to what it had been eight months previously. But this enjoyment was not long permitted the patient. In the course of three months, ulcerative action recurred, as before, without any appreciable cause, and the valuable little new creation of membrane was rapidly absorbed. As the mercury had been somewhat violent and untoward in its action, I could not feel justified in again using a medicine, which might impair the general health, in order to obtain but an uncertain, and, perhaps, very brief control over the disease.

July, 1837. For the last fifteen months, the membrana tympani of the left side has remained in the state above described; the aperture occupying nearly one fourth of the

entire membrane. The power of the auditory nerve appears gradually to become weaker, especially during the wintry months. There is considerable tenderness of the meatus of the left side, but no discharge from it. On inflating the tympanum by a forced expiration, the air is heard to rush through the opening in the membrane, and the stream is of sufficient force to flicker the flame of a wax candle. A watch, when applied to the right temple, is not heard at all, and but feebly when applied to that of the left side.] (Tr.)

CHAPTER II.

DISEASES OF THE MIDDLE EAR.

Under the title of "Diseases of the Internal Ear," Saissy has included every disease of the ear, with the exception of those of the auricle, and of the meatus. This, however, is improper, as the diseases of the cavity of the tympanum, and of the Eustachian tube, not only arise quite independently of those of the labyrinth, but also require a very different, and even opposite, plan of treatment. For these reasons, and for the sake of affording a more convenient view of them, I include among diseases of the middle ear, those only which occur in the cavity of the tympanum and in the Eustachian tube, and which are accessible, at least to our means of diagnosis, during the life of the patient, if not to our curative efforts.

From the practical and experimental character of the present work, I think I shall be justified in not making mention of such affections as malformations of the ossicula auditûs, either among diseases of the ear in general, or among those of the middle ear; leaving it to the manuals of pathological anatomy to state, that the two limbs of the stapes have been found united into one by bone; and the foramen rotundum obliterated by osseous matter, &c. Those who take delight in hypotheses which are neither proved, nor admit of proof, and who, at the same time, to the great injury of their patients, neglect the investigation, by good manual means, of those diseases which, though concealed, are yet recognisable, I shall also leave along with Saissy (*a*), Vering (*b*), and others, to dream about paralysis and rupture of the muscles of the ossicula auditûs, and expend their ingenuity in diagnosticating dropsy of the cavity of

(*a*) Essai, p. 270. (*b*) Aphorismen, p. 30.

the tympanum, and caries and anchylosis of the ossicula auditûs, &c.

Inflammation of the mucous membrane of the Eustachian tube, and of the cavity of the tympanum, with its various terminations and sequelæ; together with inflammation of the cellular tissue, situated beneath each of these membranes, are the only diseases that can be distinctly recognised, and these, therefore, are alone inserted here.

Section I.—Inflammation of the Mucous Membrane of the Middle Ear.

This form of disease has been treated of by Alard, under the name of "Chronic internal catarrh:" by Itard under the titles of "Internal Catarrhal Otitis;" "Deafness from plugging up of the Eustachian tube;" "Deafness from Engorgement of the Internal Ear;" "Engorgement and Obstruction of the Cavity of the Tympanum;" "Inflammation of the Eustachian Tube:" by Saissy, under those of "Chronic Catarrh of the Internal Ear;" and "Accumulation of Mucous Matter in the Cavity of the Tympanum;" and by Deleau as "humid catarrhal otitis." Curtis, Wright, Buchanan, Jos. Frank, and all other authors, have either altogether neglected this important morbid condition, or have treated it only as a purely mechanical obstruction of the Eustachian tube, which they merely incidentally mentioned.

It would be perfectly useless, on mere theoretical grounds, to attempt to separate diseases of the Eustachian tube from those of the cavity of the tympanum; for they present no peculiar marks by which they can be distinguished, which from the intimate connexion between the Eustachian tube and the cavity of the tympanum, must be the case. But if any such separation could be made, it would be void of any practical utility; for the diseases of both always require one and the same plan of treatment.

In order not to interrupt the description of the disease now under consideration, and its treatment, I may be allowed

to state here, every thing that relates to the mechanical means of investigating and treating diseases of the Eustachian tube, and cavity of the tympanum.

The Eustachian tube is a membranous canal, open at both extremities, connecting the pharynx with the cavity of the tympanum, and transmitting to the latter the atmospheric air. By this means the membrana tympani, which is in contact, by its external side, with the atmospheric air, is maintained in a state of uniform tension, and the transfer of the sonorous vibrations which enter from the meatus, is facilitated. It may be here stated, in passing, that it is only in this indirect way, that it assists in hearing, and not by directly conducting the sonorous vibrations to the auditory nerve. This is most conveniently proved by means of a watch, the works of which are not heard as long as it is held on the tongue, with the mouth shut, without coming in contact either directly or indirectly with bone.

Dr. Kuh (*c*) places the pharyngeal orifice of the Eustachian tube so high, that its horizon is brought to the same level, with that of the *middle* meatus of the nostrils. This view of its situation seems also to be confirmed, by the clumsy drawing of Buchanan (*d*), which represents the head strongly inclined forwards; whilst Saunders (*e*), in his drawing, has given to the head the opposite direction, backwards, so as to represent it as necessary to carry the sound beneath the level of the *inferior* meatus of the nostrils, in order to arrive at the mouth of the Eustachian tube.

I have carefully compared the sections of many heads, and have satisfied myself that the pharyngeal opening of the Eustachian tube forms a slit descending from above forwards, obliquely downwards and backwards, of an oval form, and three-eighths of an inch in length. The *inferior angle of the opening lies a little deeper than the level of the inferior nasal meatus*, and the superior angle about as much

(*c*) Rust, Magazin. Bd. xxxviii. i. p. 1, et sqq.
(*d*) Guide to Acoustic Surgery.
(*e*) The Anat. and Dis. of the Ear.

below the level of the middle meatus of the nose. So that the beak of a catheter, introduced according to Dr. Kuh's directions, through the middle meatus, readily comes in contact with the mouth of the canal, but with its superior angle; it cannot, however, be in any way rotated on its axis, so as to turn the beak obliquely outwards, and thus bring it into the same direction with the axis of the Eustachian tube, which, however, is necessary, in order to give the catheter the proper position.

Farther, the mouth of the Eustachian tube lies behind the velum pendulum palati; and is fixed by its anterior edge to the hamulus pterygoideus on each side. From this point the canal extends almost two inches in length, obliquely backwards and outwards, gradually becoming narrower, the beginning of its last third being the narrowest point, precisely where the mucous membrane leaves its fibro-cartilaginous sheath, and passes over the periosteum of the bony portion of the canal, in which the last third of the tube terminates. The diameter of this narrowest point has been very variously given. Eustachius himself (*f*) states that it will admit a writing quill. Valsalva (*g*) makes it one line high, (indeed the bony canal itself, only so much, though its membranous investment must necessarily diminish this,) so that one or other of these statements must be incorrect. In the drawing which Cooper (*h*) has given of a section of the ear, of the size of life, the diameter of the narrowest point of the Eustachian tube is represented as one-eighth of an inch; and it is thus given by Curtis, Saunders, and Teule(*i*).

Du Verney, on the other hand, in the second figure of his eighth plate, which represents a section of the Eustachian tube of the natural size, gives to the narrowest part of it a width of only one thirty-second of an inch, *i.e.* one quarter of a line, with which my own admeasurements, both in

(*f*) Opusc. Anat., pp. 161, 162.
(*g*) Tract. de Aure Hum., p. 32.
(*h*) Philos. Trans., 1801.
(*i*) De l'Oreille, p. 61.

the dead and living body, perfectly correspond. This point is of the greatest importance in connexion with Deleau's proposition, to treat diseases of the Eustachian tube with a flexible catheter, in order to dilate strictures of this canal, &c.

For the examination and treatment of the Eustachian tube, Cleland (*j*) recommended flexible silver catheters, the construction of which (especially from their being connected with an injecting syringe) is very inconvenient; and their utility is still farther diminished, by their opening being made at the side, and not at the extremity; so that the water injected does not pass along the canal, but is thrown against its sides.

The catheters used by the Montpellier physicians, as well as by Saissy and Itard, and which also appear to me to answer the purpose best, are inflexible, made of silver, six inches long, (*vid.* fig. 3,) and of a calibre varying from the size of a small crow-quill to that of a large goose-quill. Their extremity is well rounded, and they are curved, only to the distance of five lines from the further extremity, exactly at an angle of 144°, so as to correspond with the lateral situation of the mouth of the Eustachian tube. They are of the same calibre throughout their whole length, and provided with a funnel-shaped dilatation at the proximal extremity, six lines in length, in order to admit the pipe of the injecting syringe, &c. To this dilated part there is attached a ring, on the same level with the beak of the catheter, by means of which the situation of the beak may be ascertained, when it is introduced into the nose, and thus out of sight. The catheter is, in addition, graduated according to inches, which is of the greatest convenience in repeated introductions of it.

Saissy (*k*) has, in a very awkward way, changed the simple curvature of the catheter into a triple curve, and thus done away with all the convenience of its employment. He feared

(*j*) Philos. Trans. v. xli. part 2. (*k*) Essai, &c., p. 219.

(but without cause) lest the edge of the farther extremity of the catheter, should excite pain on introducing it through the nose, and has therefore given it a knot-shaped protuberance, which, if the extremity of the instrument be well rounded off, is quite superfluous.

All practitioners, with the exception of Itard and Deleau, held (and they do so still) the catheter firmly in their hand, in the direction given to it, after having introduced it into the Eustachian tube, even while they accomplish the injection. This is not only inconvenient to the patient, and troublesome to the operator, but is also very uncertain; for the least motion of the hand removes the catheter from its proper situation, and renders its reinstatement necessary. Itard has remedied this evil by the invention of a frontal bandage, the inconvenient construction of which, however, I have found it necessary to alter. My own consists of a middle piece, made of metal, bent so as to fit the arch of the forehead, and slightly padded inside; and to this are attached two straps, which fasten with a buckle (*vid.* fig. 4). To the centre of this a pair of forceps are attached, which move in a ball and socket joint, and the blades of which are brought together by means of a screw.

Before commencing the catheterism, the frontal bandage is to be placed across the forehead, over the root of the nose, and the straps buckled behind the head. The forceps are to be fixed in the ball and socket joint, and turned upwards, for the convenience of the operator. The patient sits on a stool; the operator standing before him, and having previously oiled the catheter, lays hold of it immediately before the funnel-shaped dilatation, with the thumb and two fore-fingers of his right hand, (whether it be the right or the left ear, that is to be catheterised,) so that the concavity of the instrument is turned downwards. The beak of the catheter is then to be introduced into the *inferior* nasal meatus, and pushed quickly but carefully forwards, *gliding over the bottom of the nasal fossa into the top of the pharynx.* This manœuvre must be executed with a delicate, steady hand, partly in order to

spare the patient pain, and partly in order successfully to overcome the impediments to the progress of the instrument, arising from the lateral inclination of the septum narium, and the irregularities of the muscular structure, for avoiding which no definite rule can be laid down. Sneezing need never be feared during the introduction; it has never occurred to me, during the course of a very extensive practice in this department of the medical art.

The catheter having been passed into the pharynx, the posterior surface of which the beak must be made to touch, (up to which moment, the ring, and consequently the beak, of the instrument remain directed downwards,) the external extremity of the instrument is to be elevated; the beak thus sinks, and gliding over the posterior round edge of the mouth of the Eustachian tube, (the operator at this moment carefully drawing the instrument towards himself,) touches the posterior surface of the velum palati, which is raised; the catheter is then to be rotated a quarter of an inch, on its axis, turning it outwards and upwards, at the same time that, with a certain degree of force, it is conducted into the mouth of the tube. By careful traction it is found that it is here *held fast*, by the anterior cartilaginous edge of the mouth of the canal; which, in conjunction with the perfectly convenient situation of the instrument for the patient, affords, to a practised hand, the surest sign that the catheter has acquired the proper situation. The ring then stands turned a little upwards, in the direction in which the canal extends from the pharynx to the ear. The operation is much facilitated, if the calibre of the catheter answer exactly to the width of the respective nasal meatus, if it completely fill it; on which account, a series of catheters of different calibres should always be at hand.

This mode of procedure is, undoubtedly, that which corresponds most completely with the configuration of the cavity of the nares, &c., of which I have had proof in many hundred patients, on whom I have practised the operation, on the whole, *many thousand times*. I cannot, therefore, agree

with Dr. Kuh, when he states, that the introduction of the catheter through the inferior meatus is absolutely impossible in the majority of cases, and that, on the contrary, the middle meatus is the natural and usual passage for the catheter.

The catheter is very conveniently and securely maintained in the position thus given to it, if it be fastened between the blades of the forceps attached to the frontal bandage, by screwing the blades of these tightly together, as well as the forceps themselves, in their ball and socket joint. The whole apparatus is thus so placed, that the patient may not only move his head, but may even speak and hawk, without experiencing thereby any inconvenience, or dragging, &c. If by these means, the catheter is proved to be in the proper position, no importance need be attached to the declaration of the patient, that "he feels the catheter in the ear," nor to the introduction of an elastic sound. It is quite useless to measure, previously to the operation, the distance of the Eustachian tube from the commencement of the meatus narium; the measurement must always be uncertain; and, to a steady, delicate, and well-practised hand, is quite unnecessary (*l*).

Through the catheter thus fixed, Wathen, Douglas, Saissy, Itard, and others injected lukewarm water into the Eustachian tube and cavity of the tympanum, and imagined that they could determine the state of the middle ear, by the various sensations thus excited in the ear, or by the total absence of such sensations. But these aqueous injections are attended with great difficulties and defects, of

(*l*) M. Gairal, a French army-surgeon, in a small pamphlet, which was published in Paris, last year, entitled "Recherches sur la Surdité," recommends that, before introducing the catheter, the distance of the upper *incisor teeth* from the base of the *velum palati*, should be measured, in order to acertain with more certainty when the beak of the catheter has arrived at the posterior orifice of the nasal fossa, and thus the precise moment when it should be rotated outwards. A silver blade, which he uses for this purpose, he terms a "palatometre," and which is graduated to correspond with his catheter. (Tr.)

which I have been abundantly convinced by repeated experience.

1. The patient is greatly annoyed by the reflux of the water through the mouth and nose, and it is only by great adroitness in expiring during the injection, that he prevents the water from entering the trachea, where it otherwise gives rise to troublesome coughing.

2. It is very difficult for the patient to hold his head so still during the injection, as to prevent the catheter from being thrust deeper into the nose by the syringe; and thus, not merely producing pain, but also rendering it necessary for the operator to interrupt the injection, in order to restore the catheter to its right position; and thus, the operation is protracted.

3. The syringe cannot exceed a certain size, nor the water be injected with more than a certain degree of force, with which it is often not possible to succeed in completely overcoming the opposition presented by the accumulations in the Eustachian tube and cavity of the tympanum.

4. The injections are in danger of proving injurious, by violently exciting the auditory nerve, when they are employed for the sake of examination, and the middle ear is free from all accumulations: they are, consequently, as diagnostic means, very doubtful.

5. The injections are very uncleanly for the patient, and for every thing about him.

All these important objections led Deleau to the happy idea of substituting air for water, in investigating and treating diseases of the middle ear, and by this, he has completely attained his object. For this purpose, the air is condensed in an apparatus, the construction of which, Deleau, indeed, treats as a secret, though it admits of no secrecy whatever. Dr. Westrumb (*m*) has given a drawing and description of the external form of the apparatus, without rendering us any particular service thereby; for an

(*m*) Rust, Magazin, Bd. xxxv., p. 387, et seq.

apparatus by which the air may be powerfully condensed, with as little expenditure of power and loss of time as possible, and which shall admit of a perfectly convenient discharge of the condensed air, is very easily contrived.

The following air-press, which I have constructed, completely supplies these requisites. *c b* is a cylinder, 10½ inches high, made of molten brass; the diameter of its calibre is 4½ inches, and it is fastened at *b* with strong screws, on a strong oaken stand of the height of an ordinary stool. Within the cylinder *c b*, there is a pump barrel of wrought brass screwed into it, which measures 10½ inches in height, and 2½ inches in diameter, rising at *d a* 3 inches out of the cylinder, so that the whole machine *a b* is about 13 inches high. In the piston of the pump barrel, there is a valve for the passage of the air, which, besides, passes in at the opening situated at *d*. There is a second valve in the bottom of the pump barrel, through which the air is forced into the interior of the cylinder. Both valves must be manufactured with great care. The rest of the drawing, (*vide* fig. 5.) requires no description. This newly constructed machine has the advantage over my former one, in acting more powerfully and more rapidly, in consequence of the cubic area of the large pump barrel being better proportioned to that of the diminished cylinder, for effecting quickly the desired condensation of the air.

The more forcibly the air is condensed in the apparatus, the colder is the stream which issues. Deleau feared that this coldness might be injurious to the throat in many patients, and he has, therefore, so contrived his apparatus, that the contained air admits of being warmed, by means of a spirit lamp placed underneath. But I have never yet met with patients, for whom it was necessary thus to warm the air. Deleau also boasts, that by means of particular contrivances attached to his apparatus, either aqueous injections, or gas, vapour, steam, or smoke-douches may be thrown into the middle ear; but he has, in fact, no reason to boast of these, for, without any exception, there is no

disease of the ear which, by these methods, can be treated with success; so that Deleau himself, up to the present time, has never made use of his vaunted contrivances. They are nothing whatever but objects of display; they only make the apparatus more costly, though (and this with their inventor, is the grand reason) it is also thus rendered more wonderful in the eyes of the patients. Even the gas-douche is never applicable to nervous deafness; for ætherous vapour, which is so efficacious in these cases, ought not to be forced into the ear, but, from the great irritability of the auditory nerve, should only be allowed to pass in quite imperceptibly, by its own expansive power. The manometer, attached to the air-press, is equally superfluous; a single day's practice teaches us the number of strokes of the piston which are necessary, in order to give to the air in the apparatus a certain degree of condensation. Deleau has not been so happy in attempting to banish the use of the inflexible silver catheter, for an elastic one, as he has in substituting the air for the water-douche. His reasons against the use of the inflexible silver catheter are perfectly nugatory. He says (*n*),

1. "The mucous membrane of the nose, especially in little children, will not endure the contact of this instrument." But I have not met with any such extreme sensibility, even in children of seven years of age, unless the unusual sensation be so called, which is always experienced on introducing, for the first time, a foreign body through the nasal fossa. Very ill-behaved children, as well as very sensitive adults, shrink even from the sight of an instrument, and will not submit to the introduction of either a silver or an elastic catheter.

2. "In children, the silver catheter excites the most severe pain in the ear, on the slightest motion of the head; as the catheter must always be supported against the walls

(*n*) Mem. sur quelques moy. dest. à medicamenter l'Oreille ext. et moy. p. 5, et seq.

of the Eustachian tube." On the contrary, I can assure my readers, that whenever the catheter has been introduced and fastened by means of the frontal bandage, patients of any age, do not experience the slightest pressure, even on moving the head, nor ought they to experience any, if we have convinced ourselves that the catheter has acquired the proper position. It does not rest against the walls of the Eustachian tube at all, but throughout its whole length, on the floor of the inferior meatus.

3. " During the injection, any motion excites painful sensations in the ear." Such painful sensations always arise from awkward introduction of the syringe, on the part of the operator. But no experienced person will now have recourse to injections.

4. " The silver catheter does not allow of being bent, according to the variations of the angle formed by the junction of the Eustachian tube with the cavity of the nares." If, however, any such difference of angle actually existed, the concealed situation of the parts concerned, would render it impossible to recognise it with accuracy, previously to the operation, so as to curve the catheter accordingly. However, I may affirm, that in innumerable instances, I have never met with any such difference of angle as gave rise to difficulty; the catheter curved at an angle of 144° has *invariably afforded me complete satisfaction.*

5. " In consequence of the frequent obstruction or obliteration of one nostril, catheterism of the corresponding ear cannot be effected with the silver catheter." How rarely such an obliteration occurs, may be estimated from this, that in the course of six years, among many hundred patients, I have *never once met with it;* and that hitherto I have catheterised all these patients with the silver catheter, and with the best success; so that I may affirm, that it can only be from awkwardness or preconceived notions, that catheterism, with the silver catheter, can be unsuccessful, excepting, however, in the *exceedingly rare* abnormal conditions of organisation referred to. If, however, these

exceptions must be made, I may also be allowed to make another, equally idle; that both nostrils may be rendered impervious by deformity, in which case no catheter whatever can be introduced.

So groundless are the objections which Deleau makes to the inflexible silver catheter. His elastic ones are indeed soft, but in consequence of the iron stilet with which they must be introduced, they become equally hard, and when awkwardly introduced, are equally liable to do injury as the silver instruments. Besides, the withdrawal of the stilet, by Deleau's own confession, excites pain, which, with the silver catheter, never occurs. Farther, I cannot consider it to be any advantage that "the elastic catheter may be allowed to continue in the nose for many days together;" the silver catheter is so quickly introduced, that I have never imposed on a patient the maintenance of the catheter in the nose for so long a period.

But the assertion (*o*), that the elastic catheter may be pushed into the cavity of the tympanum, and made use of as a means of dilating stricture of the Eustachian tube, displays gross ignorance of the structure of the parts in question. I here refer to what has been said above, respecting the diameter of the Eustachian tube, which, at its narrowest part, even in the healthy state, does not admit of the passage of the finest elastic catheter, putting out of the question a state of stricture. It is surprising that this bold assertion of Deleau should not have had its falsehood and feebleness refuted by Majendie and Percy, who reported on his work to the French Academy. It is amazing with what remissness and forbearance the proof of these so-called discoveries and improvements described in this work, has been treated. Thus, on another occasion, the reporters, Pelletan and Percy (*p*), state that there can be

(*o*) L'Ouïe et la Parole rendues à Honoré Trézel, p. 20.

(*p*) Extrait d'un Ouvrage inédit intit. Traitem. des Malad. de l'Oreille moyenne, p. 7.

no doubt of Deleau's being able to introduce the sponge compress into the Eustachian tube, though *they had never seen it done.* Savart (*q*) even assures us, that it is conceivable that air, when forcibly condensed, might so act on the strictured Eustachian tube as to separate its walls. This, however, has never yet been the case, nor, indeed, can be, as the air, rushing in, much more readily returns by the sides of the canal back into the pharynx, than overcomes the resistance presented by the thickened and swollen mucous membrane. The advantages afforded by the elastic catheter, of which Deleau boasts, are thus, evidently, merely imaginary, and are inseparable from disadvantages and inconveniences, that need never be feared in the use of the silver inflexible catheter, which has also the additional advantage of being readily kept clean and elegant in appearance, in consequence of its indestructible solidity. I, therefore, unhesitatingly give to the inflexible silver catheter, the preference over the flexible.

From this deviation I now return to that point of the operation at which the catheter was introduced into the Eustachian tube, and fixed by means of the frontal bandage. If the air-douche is now to be made use of for the investigation of the middle ear, the patient sits close to a table, on which he leans the elbow of the affected side, and with the hand of the same side, lays hold of the tube of the air-press, which must previously have been charged. The operator is then to introduce the metallic tip of the tube into the funnel-shaped extremity of the catheter, and place his own ear close to that of the patient, which is to be examined; and having opened the cock of the machine, he listens to the noise which the condensed air makes in rushing into the ear of the patient. It would be quite out of place here, to describe the modifications of the sound thus heard, as the results of careful observation on this subject can be detailed, only along with the diag-

(*q*) Cf. Deleau: Extrait, &c., p. 42.

nosis of particular diseases of the middle and internal ear. I may simply mention here, that if the Eustachian tube and the cavity of the tympanum are completely free and open, the air rushes in unrestrained, and strikes with an audible shock against the membrana tympani. When the first shock of this forcible stream of air is over, or if it has not been so powerful, there is heard, from the continued stream of air rushing into the ear, a blowing and rustling, which appear to issue from the external meatus, and fill the whole ear of the patient. All deviations from this noise (the peculiarity of which can be rendered clear and comprehensible, only by repeated observation) are morbid, and afford very certain conclusions as to the particular diseased changes in the organic and functional condition of the ear. Should no air at all pass up to the membrana tympani, a catgut bougie should be introduced into the Eustachian tube, which we should try to push up to the membrana tympani. This operation succeeds best, if, in the first place, the smallest possible catheter be selected, so that the catgut cannot take a different direction from that of the axis of the curved beak of the catheter, especially on making its exit from the end of the instrument, by which it would be in danger of slipping away from the opening of the Eustachian tube, down into the pharynx, and of thus exciting, in a very annoying manner, hawking and cough. In the second place, the beak of the catheter should be directed well upwards, so that it may be, in a manner, hooked on to the superior angle of the mouth of the Eustachian tube. Thirdly, a fine harp string should be selected (the E string), as the catgut to be used, on which should be marked the length of the catheter, and farther back, that of the Eustachian tube (1¾ inch). The extremity of the catgut should be made a little soft by biting it, and then passed to the mouth of the Eustachian tube, and thence very carefully forwards, in order to note distinctly any opposition that it may meet with. If it has been made to pass into the Eustachian tube to the extent of fourteen

lines, that is to say, through its whole length, usually with a slight sensation of crackling, the patient feels distinctly as though the catgut approached the middle of the meatus, whereas up to that time, he often cannot tell whereabouts the point of the catgut is. If the gut be thrust still farther forwards, so as to pass between the handle of the malleus and the incus, and to the membrana tympani beyond, the acuteness of the sensation, increases up to the moment, when, accompanied by a lancinating pain, the membrane itself is touched. The patient then imagines that he can lay hold of the gut in his ear, for so deceptive is the sensation, that it seems to pass out of the ear. If the gut is to be allowed to remain in the Eustachian tube, it should be held fast with one hand (it is immaterial which,) after having been drawn out to the distance of one inch from the catheter, not more, in order so to fix it in the given position, that it may neither slip farther forwards, by which it might occasion pain by touching the membrana tympani, nor follow the course of the catheter, which is to be removed. With the other hand, the catheter should be carefully and gradually drawn out in the direction in which its beak meets with the least opposition; at the same time holding the gut more and more firmly, until the catheter has been completely withdrawn from the nostril. The gut should then be snipped off close to the nose, and fastened by means of a strip of adhesive plaster to the ala nasi. The patient need not restrain himself in any way, not even in eating. The gut swells, and softens, and after several hours, becomes so soft, that by the repeated motions of the pharynx in speaking and hawking, it slips down into the throat, and the patient should seize this moment to withdraw it from the nose.

§ 1. *Inflammation of the Mucous Membrane of the Middle Ear, with accumulation of Mucus.*

In this form of disease dulness of hearing occurs, either

unaccompanied by any painful sensation, or at most, merely by a feeling of fulness and weight in the ear, and even in the head; or with a sensation as though a veil or a flap were hung before the ear, which only required to be removed, in order at once to restore the hearing. There is frequently a crackling noise in the ear, and a tickling irritation in the meatus; but *all these subjective symptoms are frequently wanting*. One or both ears may be affected, and there may either be no singing in the ears, or this may be present in all its most varied modifications, and it is so inconstant, that even when it has really been present at the commencement of the disease, it often diminishes and disappears, though the dulness of hearing may at the same time be increased. Dulness of hearing is the only constant symptom of which all these patients complain, though this varies much in intensity; they generally hear better in fine warm weather, at night, and in the morning, when they are perspiring slightly in bed; or when they are much heated by violent exercise of body, as in dancing, riding on horseback, running, &c.; or when, by violent hawking, they have got rid of a great deal of mucus. They hear worse, generally speaking, when they have taken cold, when the air is cold and moist, when in a melancholy state of mind, or when leading a sedentary life. We are not, however, to conclude from this, that these vicissitudes in the degree of dulness of hearing, are absolutely diagnostic of the present disease; for such vicissitudes are as frequently altogether absent. The disease may continue gradually to become worse, uninterrupted and unaffected by any changes of weather or similar influences; or it may continue unaltered for years, in the same state as that which it assumed at the onset; or, the varying character which it displayed at the beginning may sooner or later be lost, and the disease take a fixed permanent form.

If the patient be more closely examined, his countenance will frequently be found to indicate a scrofulous character, denoted by the broad nose and thick upper lip; there

is a constant or frequent stuffing of the head, much mucous secretion from the mouth and nose, a copious thin secretion of cerumen, swollen tonsils, and a chronic inflammatory state of the fauces, and of the relaxed pendulous uvula. But in many other patients there is nothing of this sort to be seen; the bodily conformation presents the strong, healthy character of robust manhood; the auditory canal is even observed to be dry, and the membrana tympani shining, smooth, and transparent, notwithstanding great accumulation of mucus in the cavity of the tympanum. No confidence, therefore, whatever, ought to be placed in these symptoms. It is very different, however, with regard to the investigation of the Eustachian tube itself; though this, indeed, must not be undertaken according to the plan proposed by Lentin, if it is to lead to any certain results. Lentin (*r*) has the patient's head placed on a table; fills the diseased ear with water; and then directs the patient to expire forcibly with the mouth and nose closed, and observes whether the water in the ear moves or not; if the latter be the case, he concludes that the Eustachian tube is closed, a conclusion which is justifiable on theoretical grounds, but in practice is not admissible, simply because no patient can hold his head so still during the operation, as to allow of the experiment succeeding, if in other respects success were possible. Itard's (*s*) advice is no better, to direct the patient to impel the air forcibly against the membrana tympani, by attempting to sneeze with the mouth and nose closed. Many patients, on doing this, feel the air enter the tympanum, although obstruction of the middle ear exists; and on the other hand, many patients cannot give any description of sensations like these, which are of an undefined character, and altogether new to them.

It is only by introducing the catheter into the mouth of the Eustachian tube, and either simply blowing through it, or introducing through it a stream of compressed air, that

(*r*) Beiträge zur Arzneiwiss., ii. 130. (*s*) Traité, ii. p. 190.

we can obtain any degree of certainty. On making this attempt, the air either does not enter at all, or only with considerable effort, and accompanied by a gurgling noise in the middle of the meatus. Tumefaction of the mucous membrane, and obstruction of the middle ear from mucus, are rendered *certain*, — when the stream of air passes directly to the membrana tympani, accompanied by an audible gurgling noise, and not only occasions an agreeable sensation of relief to the head and ear, and diminution of the tinnitus, but is also *immediately followed by a material improvement in the power of hearing*, which is easily ascertained by the watch, and which, though it may again vanish in the course of a few hours, is restored at each sitting, increases, and gradually becomes established:—or when the stream of air, at first, does not enter the ear at all, and in spite of the greatest attention, no noise is heard in the ear, no alleviation ensues, and generally no alteration in the symptoms; and it is only subsequently, after repeated sittings, that small bubbles of air are at first heard to enter the tympanum, or a small, fine, shrill-sounding stream of air passes, which gradually becomes larger and fuller, and mixed with a gurgling sound; and exactly in proportion as the stream becomes fuller and stronger, it is accompanied by *the above mentioned increasing alleviation of all the complaints, and of the dulness of hearing.* In these cases it may be considered as a rule, that the number of sittings should not exceed four, if after the fourth sitting, no distinctly audible stream of air makes its way to the membrana tympani, and no perceptible improvement in the hearing takes place: in this case there is stricture or obliteration of the Eustachian tube, the diagnosis of which will be given in its proper place. If mucous accumulation be associated with tumefaction of the mucous membrane of the Eustachian tube, the gurgling noise is indeed heard, but proportionably weaker, and with a corresponding less degree of amelioration of all the morbid phenomena.

The similarity of structure between the mucous mem-

brane lining the Eustachian tube, and that of the mouth and nostrils; the simultaneous existence of catarrhal affections of these membranes; and the peculiar disposition which they all manifest to alternate improvement and aggravation, as well as to recur, place the inflammatory catarrhal character of the present disease beyond all doubt. From the same analogy, the entirely chronic character of the disease is manifest; it may last for years, nay, even during the whole life of the patient, without any effort being made by nature to free herself of the disease. Nor does the nature of the disease become in the least changed, in course of time; it is, and continues to be, an accumulation of mucus, however long it may exist. It never passes spontaneously into stricture or obliteration of the Eustachian tube, if no more acute inflammation again attack the mucous membrane. It is for this reason that I have separated stricture and obliteration of the Eustachian tube, from that condition which consists in its engorgement from mucus, and have considered the former as distinct, independent diseases, by which means their diagnosis is also rendered more clear.

Predisposition to mucous engorgement of the middle ear, is most frequently seen in childhood and youth; (I have scarcely ever met with it in old age;) and also in scrofulous constitutions, where there is a disposition to mucous engorgements and catarrhal affections in general; though even the strongest constitutions do not exclude the development of a local catarrh, confined to the middle ear.

The most frequent, or rather the only exciting cause, is the application of cold to the head and feet, the greater or less intensity of which determines the degree of development of the disease in particular individuals.

Frequently, only one ear is affected; but if both are, not only the dulness of hearing, but also the difficulty of overcoming the disease, is always greater in one ear than in the other.

It is surprising, when we consider the extreme narrowness of the Eustachian tube, and the frequency of catarrhal af-

fections of the nares and pharynx, that mucous engorgement of the former canal should, on the whole, be rare. It is evidently of most frequent occurrence during moist autumns and springs, and in moist climates, *e. g.* in sea towns, from which places the greater part of those patients have come to me; viz. from Hamburgh, Stettin, Swinemünde, Danzig, Memel, Cüstrin, &c. Under these circumstances, I cannot understand how the so-called English aurists, who must very frequently meet with the disease in a foggy city, like London, should have scarcely any notion of the proper diagnosis of the complaint, and still less of any rational mode of treatment.

The prognosis is altogether favourable; even when the disease has been neglected, and has become firmly rooted, from having lasted for years; a complete cure, or very material improvement, may be effected by submitting the patient to a proper plan of treatment. In quite recent cases, in which the mucous accumulation is very loose, more fluid in its nature, and rather confined to the Eustachian tube, perhaps even simply to the mouth of the canal, nature effects a cure, by the unusual muscular contractions and violent movements of the body, that take place during forcible gulping and vomiting, and on other similar occasions, when the Eustachian tube is again opened with a sudden pop. This occurrence has thus acquired a kind of celebrity among patients labouring under diseases of the ear, and by many of them is anxiously and earnestly looked for, though alas! often enough in vain. It depends on the mucous accumulation in the Eustachian tube becoming loosened, independent of any direct artificial assistance, when the atmospheric air that had previously been excluded from the cavity of the tympanum, suddenly strikes against the membrana tympani. But this independent aid from nature, never occurs when the disease has already become firmly established; when the morbidly increased secretory action of the mucous membrane of the middle ear has, as it were, become habitual; when the quality of the mucus secreted has become materially altered;

and especially when the disease has become seated in the mucous membrane of the cavity of the tympanum.

In old cases, the favourable prognosis stated above, is often limited in a very annoying manner, from the great tendency there is to relapse. A radical cure is soonest, and with most certainty effected, where the constitution of the patient is not generally disposed to mucous engorgement, and *vice versâ*. When the throat, fauces, and nostrils are simultaneously suffering from considerable chronic catarrhal inflammation, the cure of the aural disease must not be reckoned on till the surrounding mucous membranes are relieved of their disease; when, if the affection of the ear has been but recently established, it will sometimes vanish without any direct treatment of the middle ear. Lax and adipose constitutions, which, from a sedentary mode of life, and rich living, afford fresh food to the excited mucous membrane of the Eustachian tube; and also scrofulous constitutions, especially in children, oppose the greatest resistance to a cure, and, at present, at least, often admit merely of a palliative treatment of the disease of the ear.

As soon as the nature of the affection has been recognised, no time should be lost in having recourse to an appropriate general and topical plan of treatment. I shall, in the first place, speak of the general treatment, because, when this is requisite, it must always precede the topical.

It is only in the most recent cases, that the fulfilment of the causal indication, by means of emetics and sudorifics of all kinds, and Russian vapour baths, &c., will probably be crowned with success; whilst experience has demonstrated, that such means are far more often completely useless. Besides, it seldom happens that we have an opportunity of treating very recent cases of this kind; and even when such cases present themselves, they are far more certainly and quickly cured by acting directly on the internal ear. Sudorifics, and other similar remedies, which are here so generally employed, are productive of no benefit, in all those cases which are only of moderate standing. The only ap-

parently favourable case that I have met with, in which mucous engorgement of the middle ear was removed during the use of Zitmann's decoction, (*vid.* Case XLVII.) cannot be adduced here; for, previously to the use of the decoction, the mucous mass had been loosened by repeated inflations of the Eustachian canal, and thus prepared for the spontaneous detachment which took place on its being rendered in some measure more fluid by the action of the decoction.

All remedies that act generally, and which are employed for the sake of carrying into effect the causal indication, should be rejected; for this reason also, that, in order to act on a very isolated organ, to which we have easy, immediate, and certain access, they must commence their action from a great distance, and place the whole organism (in other respects often perfectly healthy) under contribution, without obtaining, after all, more certain favourable results.

But, on the other hand, powerful well known remedies, such as antimonials, guaiacum, baths, &c., are indispensable in scrofulous constitutions. In these instances, however, as in all long standing cases of mucous engorgement of the Eustachian tube, the above mentioned remedies should be associated with much and active bodily exercise, residence in a warm dry climate, and the use of an invigorating, but lean and rather dry diet. Such food as tends to favour the secretion of mucus, *e. g.* beer, milk, butter, cheese, acids, &c., should be avoided. In addition, free and even copious daily evacuations from the bowels, are of the greatest importance in the treatment, for which purpose, especially in adults, aloetic purgatives will be given with the greatest advantage.

Sea bathing has often been resorted to; but in vain. As far as my knowledge extends, not the least beneficial influence is thus exerted on the general catarrhal affection, or on the disposition to take cold, and to the production of mucus; and still less on the local affection. In many cases, the last is plainly aggravated by sea bathing; so that it is earnestly to be wished that the passion for recommending

this remedy for all diseases of the ear, without distinction, may speedily be relinquished.

When, at the same time, there exist affections of the pharynx and nostrils, inflammatory redness of the fauces, pains about the throat frequently recurring, and swollen tonsils; it has been recommended to treat these by means of leeches; blisters to the throat and to the back of the neck; tartar emetic ointment, rubbed in on the same situations; emetics; purgatives, and even a course of purgative mineral waters, (*e. g.* the Kreuzbrunnen of Marien-bader, &c.); gargles of various kinds; (with which Wright, in particular, hopes to accomplish every thing;) tisanes of chicory root, &c.; and Russian and other baths. In many cases, undoubted success has attended the use of such remedies; especially in removing any accidental acute inflammatory action. But the peculiar chronic tumefaction and excitement of the mucous membrane of the soft palate and fauces, very often persist, in spite of all these means; and in a very annoying and obstinate manner, keep up the perfectly analogous state of the Eustachian tube. In these cases, as most important adjutory means, the patient should be advised to sponge the throat and neck, the upper part of the chest, and the shoulders, night and morning, with cold, fresh, spring water; afterwards rubbing the skin with a rough towel, till it becomes red and hot. He should also be told invariably to drink cold water; to gargle the throat with cold water; and to make free use of the tinctura iodini, for some weeks, as long, in fact, as the bowels will bear it; that is to say, as long as it does not give rise to cholic or diarrhœa. By these means I have succeeded in removing the tumefaction of the fauces, when all other means, even Zittmann's decoction, had failed.

If, after this, or any other mode of treatment, the arched borders of the velum palati, passing down on each side from the uvula, are observed to be *acute and well defined*, (though there should be somewhat more redness than is natural,) it may be assumed that no injurious influence is exerted over

the Eustachian tube by these parts, and that it is therefore time to apply, at once, to the direct treatment of the former.

This has been undertaken in very various ways. Riolan (*t*) first recommended perforating the mastoid process, in order, by this means, to inject the Eustachian tube, and free it from the mucus accumulated within it; and this proposition was first carried into effect by Jasser (*u*) and Hagstroem (*v*). But although some isolated and very rare cases have occurred, in which it has been practicable to throw injections into the Eustachian tube from the mastoid process, which has been accidentally opened by carious ulceration, and these injections have thus passed through the *open* Eustachian tube into the pharynx, without any difficulty; it has yet been by no means proved that injections thus made, are capable of opening the Eustachian tube when *closed*. Setting aside the consideration, that boring the mastoid process is, itself, an operation endangering the life of the patient; the stream of water thus injected, must be so impeded and enfeebled, in consequence of the irregularity of the sides of the cells of that bony cavity, that it cannot exert any force on the plug of mucus in the Eustachian tube. Arnemann (*w*) has spoken more at large than it is necessary to do here, respecting this operation, which is now only worthy of notice as a matter of history, having become of no practical interest.

I have already said (at p. 154) all that is necessary respecting the advantage, which, it has erroneously been supposed, is to be derived from puncturing the membrana tympani in cases where the Eustachian tube is closed. Curtis still considers this the chief remedy for the cure of deafness arising from obstruction of the middle ear. This operation, the mode of conducting which I need not again refer to, may here be considered under a point of view different from that

(*t*) Opera Anatomica.

(*u*) Schmucker vermischte chirurg. Schrift., iii. p. 113.

(*v*) Abhdlgen. d. Königl. schwedisch. Acad. d. Wissen., 1789, p. 195.

(*w*) Bemerk. üb. d. Durchbohr. des Processus mastoideus, &c., 1792.

which Curtis has taken up, in as much as even Itard has advised and attempted to obtain entrance for injections into the Eustachian tube through an opening in the membrana tympani, and thus to expel the accumulated mucus into the pharynx (*x*). But this is a very uncertain undertaking, for the syringe cannot be placed with sufficient accuracy against the opening of the membrana tympani, nor does the water injected pass directly, (and still less in a powerful stream,) into the cavity of the tympanum; and farther, the stream of water entering the cavity of the tympanum from a large opening in the membrana tympani, must take a lateral direction in order to be forced against the mucus and drive it into the Eustachian tube. Both circumstances diminish the force of the stream of water so materially, that the obstruction can only be overcome by an extraordinary increase of the force with which the water is injected. Even this force, however, would induce the membrana tympani to give way sooner than the plug of mucus; and all the disagreeable accidents which Itard observed in the remedial attempts that he made by injecting through the membrana tympani, such as vertigo, cephalalgia, increase of the tinnitus, &c., must naturally be associated with such an operation. Nay, he confesses that from the fear of inducing inflammation of the internal ear, he frequently abandoned the injections *before* the termination of the treatment.

The only certain plan of procedure in obstruction of the Eustachian tube, is to act directly on its pharyngeal opening, and thus on the mucous accumulation.

From excessive caution, Lentin was satisfied with introducing into the Eustachian tube, through the nose, a silver stilet of a very small size, bent conformably to the configuration of the parts, and having a small sponge attached to its farther extremity, by the pressure and friction of which he hoped to remove the mucus supposed to exist. This plan he was induced to adopt, on the very erroneous supposition that the mucus merely accumulated in the anterior portion

(*x*) Traité, ii. p. 223, et seq.

of the canal, at its mouth; but this is the case only in the very slightest examples of the affection, which from their trifling nature, scarcely ever require any particular medical treatment, such, for instance, as occur in almost every cold. In every case of any severity, the mucus fills the whole middle ear; and Lentin's instrument cannot reach thus far. Wathen, Douglas, Saissy, Itard, and even Deleau, at the commencement of his practice, injected the Eustachian tube with water; Deleau, however, subsequently abandoned the use of water, and employed the air-douche exclusively in the treatment of the present disease (*y*).

Till within the last few years, I also have made use of the water-douche with the greatest advantage and success, as will be evident from numerous cases to be detailed. And I must still declare my opinion that it is extremely useful in this affection, and cannot at all concur in the exaggerated and imaginary objections which Deleau makes to it. Nor is it attended by danger; on the contrary, it is advantageous to dissolve a little common salt in the water which is to be injected. The strength of the injection, rendered stimulant by this or any other addition, as well as the quantity of it, or the force with which it is used, must, however, be regulated according to the irritability of the middle ear, which by a little attention may be very readily and certainly ascertained. These stimulating applications should be gradually abandoned, in proportion as the relaxation and diminished irritability of the affected parts disappear, and the normal degree of irritability returns, and is at length completely restored. Solutions of hepar sulphuris, and aromatic infusions, &c., as injections, have caused acute pain, even in the teeth and the whole lower jaw, and rendered the hearing worse, in all the cases where I have had recourse to them, even when the mucous accumulations were of long standing; so that in spite of the urgent recommendations of Itard, I was compelled to abstain from employing them.

(*y*) Sur le Catheterisme, &c. Extrait d'un Ouvrage inedit, &c. Introd. à des Recherches sur le Traitem. des Mal. de l'Oreille.

Notwithstanding the indubitably good results from aqueous injections, for some years past, I have given the preference over these to the air-douche; in consequence of the extraordinary facility, convenience, and cleanliness with which it can be managed.

The air-douche should, at first, always be allowed to act with only moderate force, in order previously to observe the impression which it makes on the diseased ear; as it is impossible to calculate beforehand, what may be the thickness or tenacity of the plug of mucus, or what force must be given to the air-douche in order to overcome the obstruction. The most sure mode of proceeding is to condense the air in the machine very forcibly, and applying one ear close to that of the patient, *gradually to open the cock of the machine*, so that the whole force of the condensed air shall not be allowed to act at once on the mouth of the Eustachian tube. If the air is thus not heard to enter the canal at all, the douche may be allowed to act with its full force. In the more favourable cases, a very distant noise is heard, namely, as a small portion of air enters the Eustachian tube, and acts on the plug of mucus, passing at first in small puffs, and at length in a fine stream up to the membrana tympani. If the passage be still more free, the stream of air passes in with a howling noise, which at length becomes converted into a rattling sound (resembling the falling of heavy rain on trees,) when it obtains a completely free passage up to the membrana tympani. According as the accumulated mucus is more or less loose, this gradation and development of the changes in the noise which the air makes on entering, are heard, either during a single sitting, or in the course of several successive sittings, and afford the best rule for determining how long the operation should be continued, how often it should be repeated, and especially what should be the force of each douche.

When both ears are affected, they should each be alternately submitted to the douche. After every douche that

has passed through to the membrana tympani, a *striking improvement of the hearing distance* is observed; and this is the more striking in proportion as the last douche has arrived at the membrana tympani in a free, full stream, and with less of a gurgling noise, and *vice versâ*. If the improvement merely continue for a few hours, or if it be not on the whole very considerable, the sittings should be continued daily; but if the improvement continue unaltered till the following day or longer, it is advisable not to make daily use of the douche, lest the ear should be over-excited. By waiting a few days, or even weeks, we obtain the best tentatory preparation for the final termination of the treatment. Thus, if in the course of the treatment the gurgling noise with which the air enters vanish; if nothing but a uniform, broad, rushing sound be heard; if the faculty of hearing have again acquired its normal extent and acuteness, and have maintained this state without any interruption, we may conclude that the morbid excitement of the mucous membrane of the middle ear is removed, and the treatment may be terminated. When the mucous engorgement of the middle ear is associated with nervous deafness, or thickening of the membrana tympani, &c., the improvement of the dulness of hearing can only be so far remedied by the air-douche, as it is dependent on the mucous engorgement. When such complication exists, the same changes are observed to take place in the ear as have just been described. There is in this case also a striking improvement after each sitting, but it does not increase in proportion as the ear becomes free from mucus, and is at last stationary, though the stream of air enters so easily that the slightest puff produces a distinct sensation on the membrana tympani. In these circumstances, any farther use of the air-douche would be of no advantage. The improvement obtained by the removal of the accumulated mucus, is either such as satisfies the wishes of the patient, and is sufficient for his necessities; or the contrary. In the latter case, a farther careful examination is requisite to discover by

what abnormal condition the dulness of hearing, &c. is still maintained, and by what mode of treatment it may best be opposed. Catarrhal inflammation of the middle ear may thus be cured, with either partial or complete restoration of the power of hearing; but in both cases, in consequence of the great disposition to relapse which generally exists, the utmost attention on the part of the patient is necessary, to avoid those injurious influences which have partly excited and partly kept up and increased the disease. The patient should persevere for many months, especially if he be of a lax, scrofulous constitution, in a mode of living which not only does not favour the disposition to relapse, to colds, catarrhal affections, and mucous engorgements, but which is strongly opposed to these tendencies. Regular active bodily exercise; washing the neck and upper part of the body with cold water; drinking freely of cold water; early rising; sleeping on a mattress and beneath the blankets; a dry meagre diet, are among the principal things to be attended to, as I have already stated.

Those patients only, who are of strong constitution, and rather of a spare habit of body, and not the least disposed to mucous engorgements, may return to their ordinary mode of living after the removal of the local affection of the ear: in such persons relapses are rather rare (*z*).

Case XL. Mr. Ponath, of this place, forty years of age, of sound, spare constitution, after a severe cold, experienced a heavy dragging pain on the right side of the head, with great dulness of hearing, and an incessant, loud buzzing

(*z*) Instead of the air-press, Gairal employs a large bag of elastic air-proof cloth, for injecting air into the Eustachian tube. There is a pipe attached to the bag, by which it is placed in connexion with the extremity of the catheter, and this pipe is provided with a cock for retaining the air after inflating the bag by the lungs. The injection is effected by pressing the bag between the arm and the side. This contrivance cannot, of course, act with the force of the air-press, but may, perhaps, occasionally prove a convenient substitute. (Tr.)

in the right ear: the left continued perfectly sound. In vain had the patient endeavoured to render his ear again free, by twenty Russian vapour baths, and strong purgatives; he entirely failed. Three months had elapsed after these attempts when he consulted me. The pain in the head and tinnitus were still violent; he heard my watch only at a distance of one inch; the external ear was sound. On blowing through the catheter introduced into the right Eustachian tube, I heard the air rush with a gurgling sound up to the membrana tympani, and there ensued immediately on this, an increase to twenty-four inches of the distance at which the watch could be heard. This simple inflation was repeated on the following day. The patient himself forced his breath into the cavity of the tympanum several times a day, and thus the gurgling noise, the tinnitus, the headache, and the difficulty of hearing diminished from day to day, and after eight days, were so completely lost, that the patient was dismissed as cured; so that it might be said of him, that his disease, which had withstood several months' treatment by important remedies, had been *blown away* by a simple puff with the mouth.

Case XLI. Mr. Seifert, thirty-two years of age, also of very healthy constitution of body, observed, after a severe cold, violent buzzing and considerable difficulty of hearing of the right ear, so that four days after the origin of the disease, he could hear my watch only when applied close to the ear. The external ear was sound; the air blown into the Eustachian tube did not pass up to the membrana tympani. The left ear was perfectly sound. Injections of tepid water into the right Eustachian tube, though they gave rise to painful sensations that lasted for some hours, at the same time increased the hearing distance to twelve inches. On repeating the injections the following day, some streaks of blood were observed in the water that returned; the pains were much less after the sitting than on the previous day. The hearing distance increased to four feet. On the third

day, the patient could himself force air into the cavity of the tympanum, so that the injections were not repeated; but the patient was recommended to keep the cavity of the tympanum free from any slight collection of mucus by inflating it by his own lungs, in which he so completely succeeded, that a few days afterwards, he heard the watch with the right ear, as well as with the left, at a distance of thirty feet.

Case XLII. Eyrich, a servant, forty years of age, in other respects healthy, had been obliged to sleep, during the severe cold of winter, in so damp a chamber, that in the morning the bed covering was often frozen completely stiff. Tinnitus, which even disturbed his sleep, soon occurred, and a difficulty of hearing that obliged him to leave his place. Three months after the commencement of the disease, I found both external ears sound; but, on inflating the Eustachian tube, the air did not pass up to the membrana tympani. The tinnitus was very violent. With the left ear he could no longer hear my watch; and with the right, only when placed on the ear. Aqueous injections passed up into the *right* tympanum, even at the first sitting, brought away with the mucus a slight quantity of blood, and improved the hearing distance to two feet. On the *left* side, on the contrary, the injections did not pass to the tympanum till the third sitting, and then with the same instantaneous improvement. Altogether, the right ear required three sittings, and the left five, in order to remove completely the mucous engorgement, the tinnitus, and the difficulty of hearing.

Case XLIII. Mr. Gans, a student from Gothenburg, in Sweden, twenty-two years of age, very strongly made, had remarked, for about half a year, a diminution of his hearing, without any definite cause. I found both meatus sound, as well as the membrana tympani; but the Eustachian tubes obstructed; a copious mucous secretion in the mouth, and

some small red streaks on the edges of the velum palati. Singing in the ears occurred only occasionally, for a short time, whilst a deep-toned buzzing in the ears never failed to annoy him at evening, when at work; continued till he fell asleep; recurred, as before, on awaking in the morning; and persisted as long as all was still around him. The left ear heard my watch at a distance of fifteen inches, and the right only at a distance of ten. In this case I made use of the air-douche exclusively. At the very first sitting it rushed with a strong gurgling noise up to the membrana tympani, and increased the hearing distance of the respective ears to thirty-six and thirteen inches; at the second sitting to fifty-six and twenty inches; and so on, till, after the eighth sitting, the hearing had again acquired its full power and acuteness. During this time the buzzing in the ears was also completely lost.

Case XLIV. Mr. Gleinig, of Memel, æt. twenty-four, of very strong constitution, though disposed to obesity, attributes the origin of his difficulty of hearing to having taken cold. Immediately after this, buzzing in the ears came on, especially in the right ear, which was most severe after active exercise, and on awaking in the morning. The difficulty of hearing was most tolerable when riding over the paved streets. During a period of seven years, the patient had made use of Russian baths, repeated salt-water baths, and the acoustic oil of Méne Maurice, with all its adjuncts, without deriving the smallest benefit; by the last remedies he had been very much enfeebled. I found both meatus sound, the Eustachian tubes, according to the patient's declaration, free, but on investigation by means of the air-douche, perfectly stopped; the buzzing in the ears was as described above. The hearing distance on each side was ten inches. There was a copious secretion of mucus about the fauces, and the velum palati was of rather a vivid red colour, but free from any morbid sensation. After many unsuccessful attempts to pass a fine catgut bougie into the Eustachian

tubes, and thus act directly on the diseased mucous membranes, the patient was put on strong, dry diet, forbidden all fat and milk food, and submitted to the treatment by means of compressed air. These means proved so efficacious, that the Eustachian tubes and tympanic cavities again became open, so as to allow free passage for the air. The buzzing in the ears almost entirely ceased, and my watch was heard by the right ear at the distance of five feet, and by the left at the distance of four. The non-complete restoration of both ears to their natural state, depended on a complication with nervous deafness, the treatment of which, as the patient was obliged to leave Berlin, could not be undertaken.

Case XLV. Mr. Luecke, æt. fifty-eight, of a strong, thick-set frame, after taking cold, became affected with violent buzzing, great difficulty of hearing, and pains of the left ear, with a discharge of a thick, yellowish green pus. The right ear had continued exempt. Fomentations, leeches, and blisters had afforded only slight transitory relief; so that four weeks after the commencement of the disease, besides the above complaints, I found the left Eustachian tube stopped, and the meatus, close before the membrana tympani, as well as this membrane itself, red and much swollen. The left ear no longer heard my watch at all. The patient was ordered to make use of tepid aqueous injections into the meatus, six leeches were applied behind the ear, and tartar emetic ointment was subsequently rubbed in, till free suppuration occurred. After this, the inflammation and discharge disappeared; but the membana tympani remained opaque and thickened, and the difficulty of hearing unaltered. Injections of warm water were thrown into the Eustachian tube, which washed out, each time, flocculi of dark grey mucus, with marked alleviation of the difficulty of hearing, and of the buzzing in the ear. Eight sittings were, however, necessary, before the water passed distinctly up to the membrana tympani. Fourteen sittings

were required in order to remove the engorgement of the mucous membrane so completely as to allow the air to pass freely up to the membrana tympani. It was only now that the buzzing in the ear entirely ceased. My watch was heard by the ear at a distance of five feet; but complete restoration of the hearing was not possible; for the inflammation of the membrana tympani had left behind considerable and incurable thickening.

Case XLVI. Charles Krause, æt. eleven, of a scrofulous constitution. He complained of an uncomfortable sense of weight and fulness in the nose, which was broad at the root. He has suffered since four years of age from dulness of hearing, which has been better every year during warm summer weather. This, however, was not the case during the very hot summer of 1834, on which account, in the course of the following autumn my advice was sought. I found both meatus thickly set with hairs, and there was a copious secretion of whitish, pale yellow cerumen, the excretion of which exerted no beneficial influence on the dulness of hearing. It was only with considerable effort that the air was made to pass up the Eustachian tubes. This, however, was at length accomplished: the air rushing up to the membrana tympani with a loud gurgling noise. The very annoying sense of fulness in the ears immediately altered, and the hearing distance increased, on the left side, from four to thirty, and on the right, from one to twenty-eight inches. The patient was put on a spare diet, mild aperient medicines were given, and he was daily submitted to the air-douche, under the influence of which, within three weeks, the hearing again acquired its original, natural acuteness, and all morbid excitement of the mucous membrane of the tympanum and Eustachian tube vanished.

Case XLVII. Miss Stephan, after taking severe cold, in November, 1833, experienced acute pains in the left ear, and dulness of hearing of both ears. A short time subse-

quently, a mild, inodorous discharge took place from the left ear, with moderate and often interrupted buzzing. For these complaints, blisters, leeches, and mild injections had been resorted to in vain. A few weeks after the commencement of the disease, I found, on the right side, the meatus externus sound, the membrana tympani transparent, the Eustachian tube stopped, and the hearing distance two inches. On the left side, the meatus was narrowed, and filled with a thin, fluid, yellowish, inodorous secretion; and the membrana tympani beneath of a pale red, and perforated, so that the expired air passed out with a whizzing noise; the hearing distance was still, however, eight inches. Before both ears there was moderately loud buzzing, resembling a stream of wind. The pharynx and velum palati were considerably reddened, but free from any uneasiness. After repeated forcible blasts, the air eventually passed, with audible gurgling, into the tympanum of the right ear, and instantaneously increased the hearing distance from two to sixteen inches. The air-douche could not, however, be repeated sufficiently often; for the irritated inflammatory condition of the pharynx rendered it very sensitive to the introduction of the catheter. The improvement of the hearing was, therefore, not at all permanent, and was soon lost from fresh accumulation of mucus.

It was, therefore, necessary before anything else was done, to free the pharynx from this chronic inflammatory state; but neither leeches, emetics, purgatives, and gargles of all kinds, nor Russian baths, succeeded in effecting this. The last even excited violent pains of the left ear, externally as well as internally, and in an evident manner increased the discharge; the pains in the ear became eventually so violent, that the patient could scarcely open the mouth sufficiently wide to admit of introducing a finger. These complaints were benefited most by warm sweet almond oil, oatmeal poultices, and saline mineral water, so that it again became admissible to pay attention to the state of the fauces. But all remedial attempts that

were made, comprising the employment of iodine, alum gargles, and the repeated use of Russian baths, completely failed. The pharynx and velum palati continued unusually red, and swollen, by which the ear was continually rendered worse. It was to no purpose that I succeeded, by inflation and by the air-douche, in increasing the hearing distance of the right ear to eight feet; a few days afterwards, this considerable improvement again fell to one inch.

The patient now restricted herself to the use of Zittmann's decoction, which was persevered in with great regularity for six weeks, during which period, a sudden pop was on one occasion heard in the right ear, that is to say, the atmospheric air suddenly gained free access to the inner side of the membrana tympani. After the termination of the treatment, the patient heard my watch with the right ear at a distance of full thirty feet, which she has continued to do ever since. In this case, Zittmann's decoction evidently rendered more fluid the viscid mucus accumulated in the middle ear, and thus disposed it for spontaneous evacuation, which was announced by the sudden pop that was heard in the ear. The inflammatory irritation of the fauces and soft palate was also materially diminished by the treatment, so that it no longer re-acted injuriously on the mucous membrane of the middle ear. The subsequent treatment of the left ear does not come under consideration in this place.

Case XLVIII. Miss Von Eichman, of a ruddy complexion and in perfectly good health, has suffered for three years from difficulty of hearing, that came on without any particular cause, and has gradually increased. Her father suffered from the same malady, but in a far higher degree, and was obliged in consequence to obtain his discharge as a military man. Among other means, the patient had resorted every year to sea-bathing, which, however, evidently rendered her condition worse. I found both meatus sound,

even the secretion of cerumen was not morbidly altered. Both Eustachian tubes were stopped. The hearing distance of the left ear was half an inch, that of the right thirteen inches, with acute tingling in the former, and loud buzzing in the latter. The velum palati, together with the uvula, was much reddened; both were frequently the seat of pains of a catarrhal character, attended with difficulty in swallowing. The patient was ordered to wash the neck freely with cold water, to restrict herself to appropriate diet, and to make use for several weeks of iodine in moderate doses; by which means the affection of the throat was very materially improved. On resorting now to the employment of the air-douche, after twelve sittings, the hearing distance increased on the left side to fifteen inches, and on the right to four feet. All mucous accumulation had ceased; the air passed with a clear rushing noise into the tympanum, and even excited some pain in the ear, when impelled with any force, so that the difficulty of hearing that was still present, which was hardly remarked in conversation, evidently depended on a complication with erethitic nervous deafness. This was now, therefore, treated by the introduction of ætherous vapour, and with considerable success. The method of employing this will be described in the next chapter.

§ 2. *Inflammation of the Mucous Membrane of the Eustachian Tube with Stricture.*

In this affection, peculiar morbid sensations in the diseased ear are altogether absent, unless a certain sense of fulness in the ear is so to be considered; but even this is observed only in particular cases. In general, considerable dulness of hearing either occurs suddenly, or very gradually comes on during the course of several years, till it arrives at so high a degree that the patient is seriously incommoded. This may take place either in both ears at the same time, or first in one and only subsequently in the other also; or,

for the most part, one ear alone, continues to suffer, the other not participating in the morbid condition. Noises in the ears are frequently absent through the whole course of the disease, or merely occur at the commencement, and then for ever disappear; in other cases the patient is never for a moment free from these. Neither condition indicates either a favourable or unfavourable character of the disease.

All these patients, without a single exception, labour under chronic inflammation of the fauces and soft palate. These parts, together with the uvula, which is relaxed, and hangs down towards the root of the tongue, are either of a pale red colour, or (which is by far most frequently the case) they are of a deep, livid red colour, and streaked with large, swollen, dirty red veins. The arches formed by the velum palati, instead of presenting acute, well defined edges, form merely a thick tumefied mass, passing the one into the other, without any definite limits; the mucous glands on the surface of the velum are largely developed, so that it has the appearance of being strewed with millet seeds. Tumefaction of the tonsils is not necessarily associated with this condition of the velum.

Very frequently, the nostrils, and even the whole intestinal canal, participate in this mucous engorgement of the fauces and middle ear. A strong tendency to obesity is observed, so that, with the exception of the affection of the middle ear and of the fauces, the patients appear to be in the most blooming and robust health.

In these cases I have invariably found the meatus free from any morbid condition, though such a complication is certainly very possible, and would then have its share in producing the dulness of hearing. The membrana tympani is occasionally transparent and shining; at other times it is white as paper, opaque, dull, and so thickened, that the point of insertion of the malleus cannot be distinguished. But all this has no distinct relation to the disease of the middle ear.

From this sketch, we perceive the positive impossibility

of founding the diagnosis of the present disease on subjective symptoms, or even on any single objective morbid phenomenon, as, for example, on the state of the meatus, &c. An investigation of the Eustachian tube and cavity of the tympanum must always be instituted; but neither the water nor the air-douche answer our object here, as they only afford negative results. Neither water nor air, in this case, pass to the membrana tympani, not even after the repeated use of them, nor by increasing most powerfully the degree of condensation, with which the air-douche is thrown into the mouth of the Eustachian tube. In these circumstances we may be led to doubt whether we have really placed the catheter in the mouth of the Eustachian tube, and the more so as the tumefaction of its mucous membrane produces also swelling of the round edge of its opening, and thus no certain point of support is afforded for the beak of the catheter.

Examination by means of a string of catgut, completely removes this doubt. When such a string, of the smallest possible size, *e. g.* an E harp-string, has been introduced into the mouth of the Eustachian tube, in the manner already described, and is carefully pushed forward, it meets with an obstruction, which either cannot be overcome, or only by the most forcible pressure. In some rare cases a repetition of this opposition may occur at a second spot. If the opposition be not at once overcome, the string should be allowed to rest still for a few moments; and after such a delay, or a day or two later, it may be introduced farther. We then feel distinctly as though the catgut slipped through an annular contracted spot, on passing beyond which it again advances freely. On drawing out the gut again, it is, as it were, felt to be held fast at the constricted spot, so that it sometimes seems to the patient as though the stricture closed again behind the catgut, or as though it tore out every thing along with it, or that every thing returned into the ear; from whence it may be concluded, that there is great narrowing and cartilaginous degeneration at the

diseased spot, and that this is, beyond all doubt, incurable. If the length of the catheter has previously been marked on the gut, it is easy, by comparing with the catheter the spot where the gut arrived at the strictured part of the Eustachian tube, to calculate with accuracy the distance of the stricture from the mouth of the canal.

But if the mucous membrane of the Eustachian tube be swollen throughout its *whole extent*, and in a uniform degree, the air-douche will, in this case, no more pass through to the membrana tympani, than it will when there is merely partial stricture. The catgut, however, slips through the whole length of the Eustachian tube, by using a little force, without encountering any distinct opposition at a particular spot, till it arrives at the membrana tympani, where it occasions a peculiar pricking sensation, on touching this delicate membrane. If the catheter be allowed to remain fixed in the position in which it has been placed, in order to guide the gut properly into the Eustachian tube, immediately on withdrawing the gut, the swollen parietes of the canal close the passage again so completely, that the most powerful stream of air cannot be made to pass through. At least, I have never succeeded hitherto, notwithstanding every effort, in compressing laterally the swollen mucous membrane by means of the air-douche, so as again to restore an easy, free communication between the cavity of the tympanum and the pharynx. Deleau certainly attributes more merit to the air-douche than it deserves, when he boasts that it will accomplish thus much.

The organic condition of the parts implicated in the diseased state just described, may be easily comprehended, if we only refer the tumefaction which takes place before our eyes in the mucous membrane of the velum palati, to the mucous membrane of the Eustachian tube. This canal must be completely obliterated, by even a very slight degree of tumefaction of its mucous membrane.

Chronic inflammatory tumefaction of the mucous membrane of the Eustachian tube, continues for many years,

with the greatest obstinacy, even when it is not kept up by a general disposition to mucous engorgement, and chronic catarrhal inflammations. The accompanying dulness of hearing always attains a very high degree, either immediately on the first development of the disease, or progressively in the course of time. It may with certainty be concluded, that the chronic inflammatory tumefaction has not only extended to the mucous membrane of the Eustachian tube, but also to the cavity of the tympanum, in which there is associated a morbid secretion and accumulation, which cannot be removed until the passage through the Eustachian tube has become free.

The predisposition to this form of disease is altogether the same as that to simple mucous accumulation in the Eustachian tube; no circumstance is known which determines by preference the formation of the one or the other condition. It is surprising, from the close organic connexion between the mucous membrane of both ears, that occasionally one ear alone suffers, while the other remains perfectly free.

The prognosis is, in every respect, unfavourable. It is only in the rarest cases, that the utmost efforts of the practitioner, even when favoured by the short duration of the disease, succeed in restoring the mucous membrane to its normal condition; and thus, either by this means alone, curing the dulness of hearing, or clearing the way for its subsequent treatment. But least of all can success be reckoned on, when a lax, bloated constitution offers irresistible opposition to our best efforts, especially if the patient's mode of life continually expose him to take cold. Aside from this, however, even in the most favourable constitutions, *partial* degeneration of the mucous membrane, under the form of strictures, renders the treatment far more difficult than it is when the tumefaction of the mucous membrane is *general and uniform*.

In the treatment of this affection, the most careful attention to the constitution of the patient, and especially to the

chronic inflammation of the throat and fauces, is indispensably necessary, and must so decidedly precede the topical treatment of the strictured Eustachian tube, that from the latter no result can be expected, until the former has, in the most satisfactory manner, been remedied.

The general treatment consists, in the first place, of the use of the known therapeutic means against the scrofulous, lax constitution of the patient, which indeed frequently cannot be much changed; and, in the next place, it must be directed against the inflammatory excitement of the mucous membrane of the throat and fauces, which strikes our eye at the first glance, though occasionally it seems merely to have seized on the velum palati. If there be still pain in swallowing, leeches, emetics, purgatives, and mild gargles must be had recourse to; though even so moderate an antiphlogistic treatment as this is seldom really necessary. But I have never seen a single case that would have justified Deleau's plan of taking from the patient two ounces of blood every other day, during a month (*a*).

The patient should avoid spiced meats; heating drinks; such food and drink as favour the secretion of mucus; butter, cheese, milk, and food containing milk; leguminous vegetables; and fat and acid food of all kinds. Water, a light bitter beer, and red wine and water, are the best drinks, the stronger kinds of lean animal food, aided by free active bodily exercise, and as little sleep in the morning as possible, are the best means of counteracting the general disposition to laxity of constitution. Emetics have but little topical influence, even if they did not require to be frequently repeated, in order to act at all on a disease so firmly rooted: they readily exhaust the power of digestion altogether, which in these cases is already much enfeebled. Free, easy evacuations from the bowels are indeed requisite; but their operation does not essentially affect the mucous membrane of the fauces. Gargles are of as little use as blis-

(*a*) Introd. à des. Rech. Prat., &c., p. 90.

ters, setons, and suppuration kept up by means of tartar emetic ointment, for months, or continual excitement of the skin about the neck, by means of a small galvanic apparatus, consisting of a plate of copper and one of zinc, bound on with copper wire, and other expedients of a similar character. The patient is tormented to no purpose by all these means, while those which keep up a purulent discharge sometimes undermine the patient's general health, without in the least benefiting the topical affection. Nor does it give way any more to sea bathing; to Russian vapour baths; or to those of Tœplitz, Warmbrunner, and other places; or to an alterative course of mercury, or to salivation; nor even to the decoction of Zittmann, which acts so beneficially in scrofulous and rheumatic forms of disease.

I am disposed to pronounce very old standing, inveterate cases of this description quite incurable, and these must naturally exert the most prejudicial re-action on the tumefaction of the mucous membrane of the Eustachian tube. In slight cases, I have seen the redness and swelling of the velum palati, and the surrounding parts, vanish after long continued, assiduous, persevering washing of the throat and neck with cold water, and the use of cold water as a gargle and as drink, together with the exhibition of tincture of iodine (*b*).

If by this plan we have been fortunate enough to succeed in removing the mucous secretion and swelling of the throat, or if without any such preparatory alteration of the state of these parts, we choose to try other means before declaring the case to be altogether irremediable, we should at once proceed to the topical treatment of the Eustachian tube, to effect its dilatation by means of the catgut bougie, as the only remaining plan by which anything can be effected.

Saissy and Itard recommend the introduction of gum-

(*b*) The local application of a solution of nitrate of silver, by means of a camel's hair pencil, or a piece of sponge, is often of signal service in relieving this chronic inflammatory state of the fauces. (Tr.)

elastic bougies; but these must be inefficacious, as they do not expand, and thus do not dilate the canal into which they are introduced, nor do they in general admit of being manufactured of a sufficiently small calibre to allow of their passing through a stricture of the Eustachian tube, especially when this is situated in the inner half of the bony portion of the canal.

Deleau prefers for this purpose sponge compress, which, indeed, readily expands, but is equally incapable of being made sufficiently small to pass through a stricture of the Eustachian tube, especially when, as we are told by Deleau, that the compress is to be of the *thickness of a crow-quill* (*c*).

Catgut bougies, on the contrary, have, when even of small calibre, considerable firmness, and by having a large selection of them, it is easy to increase their size; so that when any mechanical dilatation is possible in the present disease, it is by the use of these that we may most certainly hope to succeed. As regards the manual part of this mode of treatment, I may refer to the description which I have already minutely given. I have endeavoured in vain to improve the vital condition of the swollen and diseased mucous membrane, by smearing the catgut with ung. hydr. nit. oxidi, or ung. zinci sulph., or liq. laud. Sydenhami, or with solutions of corrosive sublimate, nitrate of silver, sulphate of copper, &c. These means always failed in producing the desired effect, though their action on the mucous membrane was very distinctly denoted by the acute pain and copious secretion of saliva, which they occasioned. The beneficial effect, therefore, which Deleau professes to have seen from the introduction of an astringent pomatum into the Eustachian tube, I must still consider as doubtful.

Deleau further assures us (*d*), that a stream of condensed air as certainly dilates stricture of the Eustachian tube, as bougies do those of the urethra. But when there is real

(*c*) Mem. sur quelques moy., &c., p. 16.
(*d*) Extrait d'un Ouvrage inedit, &c., p. 42.

stricture of the Eustachian tube, the stream of air passing in, much sooner returns by the ready passage into the pharynx, than it can press on one side, and render thin the swollen, thickened, and hardened mucous membrane lining the bony portion of the canal. With the hope of accomplishing this, I have often made use of the air-douche, but have *never* thus been able to effect any real dilatation of the Eustachian tube. It is easy for a person to deceive himself, by supposing that he has by this means been more successful than I have been, if he has confounded the case with mucous engorgement of the Eustachian tube, attended by slight swelling of its mucous membrane, and as slight diminution of its calibre. Deleau merits no confidence in many of his assertions, as I have already shown, when speaking of perforation of the membrana tympani, and as I shall have abundant occasion to show in the chapter on the treatment of the deaf and dumb.

Case XLIX. Mr. Von Kamecke, with the exception of head-aches from congestion, enjoying the most perfect health, remarked, on completing his twentieth year, a gradually increasing diminution of hearing in both ears, accompanied by buzzing, sometimes violent, at other times more feeble. In the year 1833, after a perfectly fruitless homœopathic treatment of several months by Dr. Stüler, the patient made use of the purgative waters of Marienbader, and travelled in Italy and Switzerland, and certainly was relieved of his head-aches, but on returning to Berlin, they soon recurred with their original violence.

I found both meatus sound, the membrana tympani transparent and shining, and both Eustachian tubes completely stopped up, and so firmly, that no force was sufficient to make the air-douche pass through, although the patient believed that he could by a forced expiration make his breath pass up to the membrana tympani. On selecting a fine catgut string, a little effort succeeded in making it pass perfectly well up to the membrana tympani, during which no

partial stricture was remarked in any part of the Eustachian tube, so that a general tumefaction and narrowing of the tube could not be doubted. There was a good deal of mucus about the fauces, the velum palati was reddened and swollen, the uvula elongated, and there was very violent buzzing in both ears; the left as well as the right ear heard my watch only at the distance of one inch.

An issue containing three peas, inserted in the left upper arm, succeeded in removing the patient's head-aches in a few weeks, which, in spite of his sedentary mode of life, have never since returned. I was not so fortunate, however, with the principal disease. The strongest diet, free use of cold water as drink, purgatives, gargles of all kinds, leeches, even Zittmann's decoction, perseveringly made use of, (though this acted remarkably well, by producing copious excretions from the intestinal canal, from the skin, and from the kidneys,) all failed in removing the chronic inflammatory affection of the velum palati and pharynx.

In these circumstances it was not surprising that every effort by means of the catgut bougies, and the air-douche, failed in effecting a permanent dilatation of the Eustachian tube; the mucous membrane always swelled again, as soon as the action of the mechanical dilators ceased. Perforation of the membrana tympani would have been equally vain; for the chronic inflammatory process had certainly extended to the mucous membrane of the cavity of the tympanum, so that I was obliged to dismiss the patient as incurable.

Case L. Mr. Wulff, thirty-eight years of age, in other respects in very robust health, had suffered for some years from difficulty of hearing, at first affecting the left ear, and afterwards the right also; in the former there was very violent buzzing, and in the latter less. Repeated Russian vapour baths, bleedings, leeches, strong purgatives, even a course of calomel, and salivation, failed to prevent the malady from becoming worse, to say nothing of improving it.

I found both meatus sound, the membrana tympani shining and transparent, both Eustachian tubes, in spite of the patient's assertion to the contrary, perfectly inaccessible to the air-douche, much mucus about the fauces, and the velum palati swollen and reddened. There was violent buzzing on both sides, so that the left ear could no longer hear my watch at all, and the right not beyond the distance of one inch. Making use of strong diet, and much bodily exercise, and enjoying in other respects the best health, the patient began by taking large doses of sal ammoniac; and subsequently tinct. pimpinellæ, aloes as a strong purgative, and gargles of all imaginable astringent compositions were used. But, though this treatment was pursued uninterruptedly for four months, and the patient experienced not the least pain in the throat, the redness, tumefaction, and excitement of the mucous membrane of the fauces and pharynx still continued unchanged.

It was, therefore, not surprising that the topical treatment of the Eustachian tube proved equally unsuccessful. I began with the harp string E, and then took a guitar E, a violin E, a guitar H, a violin A, and even an A harp string, all of which, in rotation, were easily introduced up to the membrana tympani; with the exception of the last, which from its swelling excited pains so violent, that it could not again be introduced. It was of no avail that the strings were alternately smeared with laudanum, red precipitate and zinc ointments, and a solution of zinc; as soon as they were removed from the Eustachian tube, not a puff of air passed into the tympanum. In the present instance, also, perforation of the membrana tympani was omitted on the same grounds as in the former case; the patient left Berlin uncured, and certainly incurable.

Case LI. Mr. Von Rudolphi, whose case has already been detailed under No. XXXVIII, in connexion with perforation of the membrana tympani, to which he had submitted,

obtained no better success. I here return to the case once more, because he suffered under stricture of the Eustachian tube.

On introducing a catgut string, it passed forward about three lines, giving rise to slight pain; at this point it encountered an obstruction, which was only overcome by repeated forcible pressure. The string slipped forward as though passing through an annular contraction; from two to three lines farther on, it met with a second obstruction, which was only overcome four weeks subsequently, so as to allow the string to pass up to the membrana tympani. On withdrawing the gut, the patient felt as though the whole canal were dragged out along with it; and on the gut leaving the constricted spot, he felt as though the canal closed again behind it. In fine, the contractions were not permanently dilated, and perforation of the membrana tympani afforded no beneficial results; so that this patient also, was obliged to be left uncured, and truly incurable.

§ 3. *Inflammation of the Mucous Membrane of the Eustachian Tube, with Obliteration of the Canal.*

This very rare form of disease is not indicated, either at the time of its development, or in the course of its progress, by any peculiar characteristics of a subjective kind. The patient merely hears with difficulty, without, in the course of time, any striking change being remarked in the degree of intensity of the dulness of hearing. Noises in the ears may be present, and they may also be absent. On closer examination, the meatus is found to be sound; but the air-douche, even when the utmost degree of force is expended on it, does not pass to the membrana tympani; nor is the least noise heard in the patient's ear whilst the douche is streaming against the mouth of the Eustachian tube. On passing a catgut bougie to the mouth of the Eustachian tube, it either cannot be made to enter at all, or it passes only a short way forward, according to the distance from the mouth of the canal at which the obliteration is situated. When

this obliteration extends even to the mouth of the canal, the round edge of its opening is rendered so misshapen by the tumefaction of its lining membrane, that the catheter is not supported by it, and the practitioner cannot ascertain with certainty the spot where the mouth of the Eustachian tube is to be found, and where the catheter must be fixed. The state of the membrana tympani has no influence whatever on the diagnosis; the inflammation, which has caused the obliteration, may have left the membrana tympani as perfectly untouched in texture, as is frequently the case in chronic inflammation of the mucous membrane of the cavity of the tympanum, with morbid secretion and accumulation of mucus.

I have met with obliteration of the Eustachian tube, only when both ears were simultaneously affected. Whether, in particular cases, the accompanying dulness of hearing depend on this obliteration alone, or whether a nervous complication may also exist, can indeed never be determined with certainty.

The most important cause of inflammation of the mucous membrane which gives rise to obliteration, is cold. Saissy (*e*), Itard (*f*), Saunders (*g*), and others, it is true, attribute it particularly to cynanche maligna, and syphilitic sore throat; but the last two authors are no authority on the subject; for Saunders was quite unacquainted with catheterism of the Eustachian tube, by which alone it is possible to decide on the probable existence of the obliteration; whilst Itard never made use of catheterism in any of the cases of this description which came before him. He filled the meatus with water, and the patient, resting his head on a table, was directed to make a forcible expiration, when, if no movement of the surface of the water occurred, Itard believed he might conclude that obliteration of the Eustachian tube existed. Feeling, however, the uncertainty of this diagnosis, he endeavours to confirm it by commemorative symptoms;

(*e*) Essai, p. 184. (*f*) Traité, ii. p. 190. (*g*) The Anatomy, &c., p. 79.

in this, however, he has succeeded no better. Saissy, it is true, investigates obliteration of the Eustachian tube by means of the catheter, but with this alone, and not at the same time with the catgut bougie, without which it is not possible to distinguish obliteration from obstruction occasioned by viscid mucus, and still less from stricture of the Eustachian tube.

It is, therefore, only after a thorough investigation of this canal, by means of the catgut bougie, introduced by a practised hand, and when at the same time accurate ocular inspection of the pharynx, associated with a perfect knowledge of the state of integrity of the ear, previous to the occurrence of ulceration of the throat, refers the development of obliteration of the Eustachian tube to syphilitic or gangrenous ulceration, (which has never yet been done,) that these affections can be considered as connected with the present disease.

For the same reasons, I altogether deny the connexion of closure of the Eustachian tube, with enlargement of the tonsils. I have frequently seen this enlargement, both with and without the least dulness of hearing, but always with the Eustachian tubes perfectly free. I confess that I cannot at all comprehend how swollen tonsils should press together the mouth of the Eustachian tube, and close it against the admission of air, and may assert that none of the practitioners who have admitted such mechanical effects, have ever satisfactorily investigated, by means of the catheter, the closure of the Eustachian tube, in any one single case of the kind. This reproach applies even to Itard. From his very defective method of investigation, he ought not to have been surprised that so frequently no amelioration of the dulness of hearing occurred in those cases, in which he attempted to cure it by excision of the tonsils (*h*).

The prognosis is most unfavourable; obliteration of the Eustachian tube must be considered absolutely incurable.

(*h*) Traité, ii. 174.

Saunders and Itard still rely on perforation of the membrana tympani; but the cases detailed by Itard, in which the operation was had recourse to, even if the results had been more favourable than was actually the case, would prove nothing for the applicability of the operation to obliteration of the Eustachian tube; as the diagnosis of this was never once established by him. In my opinion, the operation is to be altogether rejected in these cases, for the inflammation which has so seriously disorganised the mucous membrane of the Eustachian tube, cannot have spared that of the cavity of the tympanum, in which case the result of the operation is more than doubtful.

Saissy (*i*), whose diagnosis is very uncertain, adopts another plan, which is still more decidedly to be rejected; for it is absolutely dangerous. He is bold enough to perforate the obliterated part, by means of a stilet, which is to be introduced through the catheter; but he has only undertaken the operation in a single instance, and even then did not carry it through. After having thrust in the stilet six lines deep without succeeding, he durst not proceed farther. He however, gives himself great credit for having devised the operation, without reflecting that an impracticable operation redounds to the honour of no man. It is impracticable, on this account; the stilet on passing out from the catheter, in consequence of the curvature of the latter, takes a direction which is altogether opposed to the straight direction of the Eustachian tube, obliquely upwards and backwards, and if the obliteration has taken place at the mouth of the canal, the exact situation of the aperture cannot in any way be ascertained, and still less be hit on, and perforated by the stilet.

From the concealed situation of obliterations of the Eustachian tube, from their being surrounded by parts so important, and from their being so difficult of access, it is a most absurd proposal of Th. Perrin, to attempt to cau-

(*i*) Essai, p. 190.

terise these, by means of a modification of Dücamp's apparatus for destroying strictures of the urethra (*j*).

In my opinion, no attempt should be made to remedy this obliteration; it must remain for future observation, to point out the circumstances under which any plan may probably be undertaken for the alleviation or removal of this morbid state; though it is very much to be doubted whether any such plan will ever be devised.

Case LII. The Countess of K——w, sixty years of age, of a very strong constitution, had suffered for twenty years from a serious degree of dulness of hearing, without any particular alterations in its intensity having been remarked during the whole of this time. Russian baths, and various other remedies had been employed, without any advantage, even without in the least improving the tinnitus. The patient believed that, by expiring, she could distinctly force the air up to the membrana tympani, which, however, a more close investigation of the ear proved to be incorrect; for neither the water, nor the air-douche, nor even a catgut bougie, could be made to pass beyond three or four lines up the Eustachian tube, on either side. Obliteration of the canals could therefore no longer be doubted. The meatus indeed were free, and the membranæ tympani transparent and shining; but I have too often found the membrana tympani shining and transparent in different morbid states of the mucous membrane of the cavity of the tympanum, to allow of my concluding from such a condition of this membrane in the present instance, that the cavity of the tympanum was in a state of perfect integrity; so that, in this case also, the result of perforation of the membrana tympani would have been very doubtful. I, therefore, did not hesitate to declare the patient incurable, and to forego any treatment.

(*j*) In Saissy, Essai, p. 189, note.

SECT. II.—INFLAMMATION OF THE CELLULAR TISSUE AND PERIOSTEUM IN THE CAVITY OF THE TYMPANUM (TRUE INTERNAL INFLAMMATION OF THE EAR).

There are two forms of this disease which must be distinguished, as they differ very materially from each other in their course.

§ 1. *The acute Form of internal Inflammation of the Ear.*

Here febrile symptoms of a decided character occur, accompanied by alternations of heat and cold, which are more violent towards evening, and remit towards morning; and in the course of these symptoms, the patients complain of acute, pricking, burning, tearing, boring, and dragging pains at the bottom of usually only one ear. These pains often extend to the pharynx, give rise to difficulty in swallowing, and are accompanied with tinnitus, great sensitiveness to the least noise, a confused perception of sounds, and dulness of hearing. The pains are increased, on moving the lower jaw, on sneezing, coughing, or stooping, &c., and shoot through the head in all directions. As the disease increases, the pains extend over the mastoid process (which is painful on pressure), over the whole vicinity of the ear, over the temporal bone, and towards the vertex or the occiput. Not unfrequently the vicinity of the ear is swollen, especially the skin covering the mastoid process, which becomes red; the eye of the affected side is sensitive to light, suffused with tears, and reddened; but the meatus, at least in the commencement of the disease, remains unaltered. The fever augments, the nights become sleepless, and are passed in pain of the head of the most insupportable character; furious raving delirium occurs, with an extremely quick, hard pulse, great heat of skin, urgent thirst, constipation, high coloured urine, anxiety, restlessness, vertigo, loss of appetite, and even vomiting. In the midst of these very violent symptoms, a purulent fluid suddenly bursts through the tympanum, and out of the ear, or the mastoid process, if it have displayed a dark livid red

colour, with more or less evident feeling of fluctuation, opens or is artificially opened, and discharges a bloody puriform fluid, which, in both cases, is of a very offensive odour, and mixed with bony fragments, or even with the ossicula auditûs, in which case the probe strikes on the uneven surface of the petrous bone, or of the mastoid process.

In favourable cases, when this discharge takes place, the fever, pains in the head, and in general all the symptoms are alleviated, or may disappear altogether, excepting a persistent otorrhœa, and considerable dulness of hearing. In unfavourable cases, especially under the influence of a cachectic state of the whole constitution, hectic fever succeeds to the acute fever, attended by emaciation, profuse perspiration, cephalic pains, rather of an oppressive character, returning from time to time, in the course of which the patient suddenly, and quite unexpectedly, dies apoplectic.

If, however, no discharge of pus takes place, the symptoms increase to such a degree, that death ensues in the course of a few days, with the phenomena attendant on the most acute inflammation of the brain, with delirium, &c.

§ 2. *The Chronic Form of internal Inflammation of the Ear.*

In this form is observed a degree of dragging, tearing pain in the ear, without any serious general affection, excepting a striking degree of debility, but always attended by tinnitus, and considerable dulness of hearing. A discharge from the ear soon appears, attended by destruction of the membrana tympani, from which, however, it is, in general, vain to hope for any relief from the pain. This usually continues unaltered, becomes even still more acute, and extends farther into the head, which feels to the patient confused and heavy: there is great dejection and drowsiness, distinct, and frequently occurring febrile chills, and slight delirium, which passes into coma, and thus ends in death.

In other cases of this kind, no otorrhœa occurs; the pain extends still deeper into the head, though it is not of an

acute kind; the patient becomes melancholy, dull, takes no notice of any thing, moves his head backwards and forwards, holding it between his hands, leans it towards the affected side, and in the course of similar slight febrile phenomena, falls into the same comatose state, and thus dies, as in the cases just mentioned.

Scarcely different from that just described, is the progress of the disease in those patients who have for a long time suffered from otorrhœa, accompanied either with destruction, or with an entire state of the membrana tympani. The discharge, in these cases, may vanish on the occurrence of more acute inflammatory action of the affected parts; or, it may continue undisturbed, and yet the disease may not, on this account, threaten to terminate fatally in a different manner. That is to say, when renewed or augmented inflammatory excitement occurs in the ear, which has already long been suffering, fresh, or more acute pain than had hitherto existed, takes place; there is ædematous tumefaction of the cheek, and of the eye-lid of the corresponding side, great depression and debility, frequent chills, and transitory heats, (which, from their periodicity, may readily give rise to the suspicion of the existence of some latent intermittent fever,) low muttering delirium, and coma, which inevitably carries off the patient. The pulse, in these cases, is at one time frequent, and at others perfectly natural, and sometimes even slower than in health. If we succeed in removing the cerebral affection, there always remains great danger of a relapse, which takes place on the application of the slightest causes that act injuriously on the ear, and threatens to destroy the patient the more certainly, in proportion to the difficulty with which he has, on the previous occasion, been saved from imminent death.

The morbid appearances discovered after death, are essentially the same in both the acute and the chronic form. Pus is found in the cavity of the tympanum, in the labyrinth, and in the cells of the mastoid process; there is softening and carious degeneration of the latter, as well as of

the petrous bone, to a greater or less extent; the dura mater covering the petrous portion of the temporal bone is discoloured, detached, and thickened; and this, as well as the brain and cerebellum, are in a state of suppuration, and finally there is effusion of serum between the membranes. These serous and purulent accumulations are frequently connected with the cavity of the tympanum and the meatus, by means of the carious petrous bone, and thus partially obtain exit by the meatus.

Alard (*k*) describes, (at least partially,) the disease just depicted, under the name of "acute internal catarrh." Itard represents two forms, "internal catarrhal otitis," and "internal purulent otitis" (*l*), the names of which are proper, but his description is quite incorrect. The difference, according to his description, consists merely in the difference in degree of the acuteness of the symptoms; but this is far from denoting any difference of intrinsic character, such as really exists between catarrhal and phlegmonous inflammation. Itard's internal catarrhal otitis (*vid.* supra, inflammation of the mucous membrane of the middle ear, with mucous accumulation) in by far the greater number of cases, according to him, terminates in perforation of the membrana tympani and the escape of pus, because the Eustachian tube has become closed in consequence of the inflammation. But this is a most erroneous view; for in perforation of the membrana tympani, which is always the result of inflammation of the membrane itself, the Eustachian tube is most generally found pervious, so that there would have been no obstacle to the discharge of the pus through this passage, had there really been any purulent accumulation in the cavity of the tympanum. On the other hand, I have seen many cases of catarrhal inflammation of the middle ear, of very long standing, where the Eustachian tube was really obstructed, and yet without any of the acute symptoms which Itard attributes to these cases, and without these

(*k*) Essai sur le Catarrhe de l'Oreille. (*l*) Traité, i. 172, 175.

catarrhal inflammations having occasioned rupture of the membrana tympani, though they had been completely neglected. But finally, Itard cannot make good his opinion, for this reason; in the cases which he has adduced as examples of internal purulent otitis, he has neither examined the perforated membrana tympani, nor the cavity of the tympanum, which he states to have been the seat of the suppuration, nor the Eustachian tube, the obstruction of which he takes for granted. Nay, he gives his readers credit for sufficient credulity, to tell them, that, in a case of internal purulent otitis, he at one time evacuated a cup-full of pus from the cavity of the tympanum, which is clearly impossible, and is probably to be explained on the supposition that the discharge was occasioned by suppuration of the parotid gland and its surrounding cellular tissue, which had opened into the throat. Even in this important case he did not investigate the Eustachian tube, and still less did he endeavour through this canal to obtain access to the cavity of the tympanum, to relieve its supposed morbid condition; but he perforated the membrana tympani, and directed against it with *great force*, aqueous injections, from which the patient derived no relief whatever, which only occurred several days subsequently, when the purulent matter obtained exit by the Eustachian tube. The third and last case of this kind which he gives, not from his own practice, is equally deficient of accurate investigation, by which the existence of an internal purulent inflammation of the ear is made evident, so that I cannot allow that Itard had any knowledge of the true character of this disease: he has evidently confounded it with slighter cases. Curiously enough, the single case of so-called internal *catarrhal* inflammation of the ear, given by Itard, ran a much more acute course than the case which he describes as phlegmonous purulent inflammation of the ear: in the former instance, the patient died. The appearances observed in the post mortem examination did not accord with the acuteness of the morbid phenomena occurring in the ear, so that the

deficiency of a careful local examination, during the existence of the disease, becomes thus still more perceptible. The principal affection in this case, appears to have had its primary seat in the membranes of the brain rather than in the ear.

Schwartz (*m*) describes inflammation of the ear in children in a manner that shews he meant internal phlegmonous inflammation of the ear; but his description fails in distinguishing accurately between internal and external inflammation, though this at least may be done, even in children, by means of objective signs. He gives no account of any post mortem appearances, and in his treatment, so completely mistakes the true character of the disease which he has described, that he hesitates not to drop into the ear tincture of opium, &c. His work, therefore, is not only of no utility, but may, in a therapeutical point of view, be even absolutely injurious.

Under the too general name of "internal inflammation of the ear," (to which denomination catarrhal inflammation of the mucous membrane of the cavity of the tympanum, has an equal right to lay claim,) Krugenberg (*n*) describes the acute form, the proper phlegmonous inflammation of the cellular tissue of the cavity of the tympanum. It is to be regretted that neither he nor his contemporary, Abercrombie, (to whom we are indebted for an admirable description of the chronic form of this affection,) have investigated either the external meatus or the Eustachian tubes of their patients. Abercrombie still further diminishes the value of his work, by very incorrectly considering the cerebral symptoms as primary, and the affection of the ear as merely secondary. The cases detailed by himself show this opinion to be incorrect; for it is evident, from the circumstantial accounts both of the diseases and the post mortem examinations, that the primary affection is refer-

(*m*) Siebold's Journal fur Geburtshülfe, &c., Bd. v. i. Hft. pp. 160, 173.
(*n*) Jahrbüch, &c., p. 203.

ible to the ear (*o*). The communications on this subject made by Bonet (*p*), and Morgagni (*q*), are totally deficient in circumstantial detail, and are, therefore, of no value.

The opinion above given respecting Abercrombie, is not invalidated by his having, in the third edition of his work, p. 38, declared that inflammation of the dura mater occurs very frequently in those who, from purulent discharge from the ear, or from the existence of deep seated suppuration behind the ear, manifested a disposition to disease of this membrane, and that the inflammation affecting the ear, which is the seat of scrofulous suppuration, is often transferred to the dura mater, and thus proves fatal. These are still mere idle words, which seem to have had no influence whatever on Abercrombie's practice at the bedside of the patient. We especially miss in all the histories of his cases (3rd ed., p. 28, 32, 39, 59) the indispensable local investigation of the affected ear during the life of the patient, as well as any regard to the affected ear in the treatment; whilst even in the post mortem examination, he pays but little and quite inadequate attention to the ear, the whole of which is devoted to the brain and its membranes (*r*).

In children, it is peculiarly difficult to recognise the present disease; for the complaints, which at first are but slight,

(*o*) On Diseases of the Brain, p. 32, et seq. 1st edit. 1828.

(*p*) Sepulcretum, pp. 342, 344. (*q*) De Sedibus, &c., i. p. 222, et seq.

(*r*) Dr. Kramer has not escaped from the charge of having mistaken Dr. Abercrombie's views, by referring to the third edition of Dr. A.'s work, as showing that he had expressed himself differently in his last edition. The passage to which Dr. Kramer refers, as contained in Abercrombie's third edition, p. 38, is also contained in the 1st edition of the same work, p. 40. In another passage also of the *first* edition of his work, Dr. A. represents *idiopathic* inflammation of the dura mater as *rare*, but states immediately afterwards, that it is *frequently* met with in connexion with affections of the ear and of the petrous portion of the temporal bone. Nor does it appear to me, that Dr. Abercrombie merits the charge of having overlooked the ear, either at the bedside of the patient, or in the examination of the body after death; excepting that he makes no mention of the state of the Eustachian tube, and therefore could not have known the precise condition of the middle ear. (Tr.)

are easily overlooked, and in the more advanced stages, the brain alone is very apt to be regarded, to the almost total neglect of the ear.

Pain in the head, therefore, when associated with continued, though not equally severe, pain in the ears, (which in children is denoted by their frequently putting their hands to their ears,) should induce us to examine the ears, both externally and internally, with the most scrupulous care. In inflammation of the cellular tissue of the middle ear, the membrana tympani is likewise inflamed and very sensitive, as is also the meatus, on the least motion of the lower jaw, as in chewing, gaping, &c. The Eustachian tube, when an examination of it can be made, is found closed, and at its mouth very sensitive, even to the air-douche. Observant patients remark very distinctly that all their complaints originate in the ear, and extend thence to the head, and to the eye, &c.

Especially important, however, is the sudden suppression of a previously existing discharge from the ear, which is only the more readily overlooked, the less importance the patient is disposed to attach to the suppression of a discharge to which he has for years been accustomed, and the less he is disposed to call the practitioner's attention to the circumstance, in consequence of the state of morbid listlessness in which he is. The diagnosis, however, becomes most difficult in those cases in which the discharge from the ear is not suppressed, or where the painful sensations in the ear are soon stunned by the augmenting cephalic complaints, which turn all the attention, not only of the patient but also of the practitioner, to the cerebral affection.

But even in these circumstances, which render the diagnosis so extremely difficult, a sure guide is not unfrequently met with in the simultaneous affection of the mastoid process. This is observed to be of a livid red colour, and indeed is felt to fluctuate, and on being laid open either naturally or artificially, the bone is found to be carious, and by carefully giving to the probe the proper direction, it may

thus be introduced into the cavity of the tympanum. If there be an opening in the membrana tympani large enough to admit the blunt end of the probe, this is then the most direct way of discovering the carious condition of the petrous portion of the temporal bone.

The course of the disease, as has already been intimated, is sometimes very rapid, terminating in, from five to seven days, and sometimes protracted for weeks and months, when fresh accessions of inflammatory excitement occur, at longer or shorter intervals, and are repeated either till the patient, in some rare cases, is restored to heath, or till, as is more generally the case, death ensues.

Childhood and youth, a gouty, syphilitic, or scrofulous dyscracy, and long standing purulent secretion in the tympanum and the meatus, peculiarly predispose to this inflammation of the cavity of the tympanum. The above-mentioned dyscracies, however, rather predispose to the chronic form of the disease, which invariably terminates in caries.

The onset of the inflammation, particularly of the acute form, is almost always occasioned by the application of cold to the ears, or by metastatic transference of the cutaneous inflammatory action, in scarlatina, small-pox, &c., while mechanical injuries, such as concussions from blows, &c., very seldom affect the ear in the manner just described.

The prognosis is in the highest degree unfavourable, even when the disease is early recognised, and treated in the best and most energetic manner. The disposition to caries is often so great, that, in the most favourable cases, the function of the ear is materially and incurably injured. If the inflammation have spread to the membranes of the brain, and induced suppuration between these membranes and the pars petrosa, or the brain, though it is not always possible to decide on the existence of this during life, death is inevitable.

Every complication of cerebral affection with internal inflammation of the ear, is the more dangerous, as the only hope for the latter depends on means which favour suppuration, by the operation of which the cerebral affection inva-

riably becomes fatal. The establishment of a channel of communication, and of a discharge for the cerebral abscess, through the pars petrosa, into the meatus, may indeed retard the fatal termination, but will not prevent it: the relief obtained is quickly interrupted by very unexpected death from apoplexy.

The practitioner in attendance has, therefore, in these cases, to deal with a mighty, all-powerful enemy, whose influence he must endeavour to enfeeble by prophylactic means, by curing any otorrhœa, whether arising from the external or middle ear. If the inflammation have been completely established, whether it take an acute or a more chronic course, it is only by the most energetic antiphlogistic treatment (which, in the acute form, must be the most perseveringly persisted in) that the patient can possibly be saved. Full bleeding must be had recourse to, and this is best effected by opening the jugular vein, or even the temporal artery; a large number of leeches should be put on around the affected ear and to the temple; calomel, in large doses, should be given alternately with full doses of purgative salts; mercurial ointment rubbed in about the ear; and, when the cerebral affection at all admits of it, emollient poultices should be kept continually applied to the ear, while the meatus should be filled with lukewarm water, or oil of sweet almonds. The last-mentioned emollient topical treatment is especially requisite, when the inflammation of the middle ear has been excited by the suppression of a long standing otorrhœa, or even when it merely seems to have been so produced; the bread poultices should then be persevered in, until the discharge re-appears, and all unusual sensations in the ear have vanished. It is probably, only then, as noticed above, that the very dangerous circumstance becomes evident, that this emollient maturating treatment is strongly contra-indicated by the acuteness of the cerebral symptoms. From the great importance of the topical emollient plan of treatment, I am much disposed to ascribe the want of success, which attended the otherwise judicious

treatment of Krugenberg and Abercrombie, principally to their total neglect of this topical treatment of the affected ear. Krugenberg contented himself with dropping camomile tea into the affected ear, the greatly augmented sensibility of which was not able to bear even this very moderately irritating application: he lost six out of the seven cases which he details. Abercrombie gives only cases which terminated fatally. I have already stated how extremely dangerous it is to introduce tincture of opium into the inflamed ear, as practised by Dr. Schwartz, and can only repeat here the most solemn warning against such a mode of practice.

By the above-mentioned topical and general plan of treatment, the membrana tympani bursts, and affords exit to the pus accumulated within, the discharge of which is to be kept up (as long as it is accompanied by inflammatory symptoms) by the same emollient treatment, and by keeping the patient in a proper position on his side. When the peculiar inflammatory character of the disease has disappeared, the cavity of the tympanum may be rinsed out by mild, cautious injections of lukewarm water; a weak solution of acetate of lead may be thrown in, and tartar emetic ointment rubbed in below the mastoid process, so as to produce free suppuration. If caries of the pars petrosa has occurred, it may be considered extremely fortunate, if it be so superficial as to be gradually exfoliated. Asafœtida and phosphoric acid, given internally, can hardly exert much influence on this part of the organisation, which is so feebly endowed with vitality. The same treatment is necessary, when the chronic character of the disease renders a long continued antiphlogistic treatment inadmissible. In all cases it is vain to indulge in any hope, whenever the disease of the ear has overstepped the limits of the organ of hearing to which it was originally confined, and has seized on the membranes of the brain. No efforts of art can snatch such patients from the hands of death.

Where pus has been formed within the cavity of the

tympanum, Itard recommends an artificial opening of the membrana tympani, in order to afford exit for the pus, which might otherwise make its way out by destroying the cells of the mastoid process. But from the great delicacy of the membrana tympani, which is soon eroded and perforated by the slightest degree of inflammation, whatever hindrance to the exit of the pus it might present, in acute inflammation of the cavity of the tympanum, which never spares this membrane, an artificial opening is quite unnecessary; it is soon enough effected by the inflammation itself, and in general does not materially diminish the danger of the case.

Laying open the mastoid process is of much more importance, whenever fluctuation is discovered, or even when the periosteum yields to the pressure of the finger. The integuments should then be divided, and if necessary, the periosteum also; but all irritating injections should be avoided, as long as any trace exists of inflammatory excitement of the affected organ. The constant use of emollient warm poultices, and gentle injections of lukewarm water, are the best means that can be employed. At a subsequent period, here also, solutions of acetate of lead are advisable. For caries of the ear, Krugenberg recommends asafœtida, with phosphoric acid, given internally; and for the discharge, the external use of solutions of corrosive sublimate and nitrate of silver with opium.

If we are convinced of the dependence of chronic inflammation of the middle ear on a cachectic state of constitution, the persevering use of known remedies for this condition must not be neglected. In like manner, we are taught by special therapeutics how to treat the hectic fever, which is induced by long-continued caries of the organ of hearing.

"Case LII. A soldier, named Hittberg, had suffered for many years from pain in his ear, discharge of pus, and great difficulty of hearing. Notwithstanding this he was appointed to his regiment, but three weeks afterwards, he had violent fever and dreadful pain in the right ear. In

the left ear the pain was supportable. A bleeding, emollient poultices to the right ear, a second bleeding, blisters, and enemata, in some measure diminished the pain, which, however, always returned, though the discharge was never interrupted. During the most violent pain, a blister had been applied to the mastoid process of the affected side, and thus a slight elevation had been induced over this spot, which indistinctly fluctuated. After repeated applications of emollient poultices, an incision was made through the swelling, an inch long, down to the bone. The bone was rough, worm-eaten, and presented an opening, from which, however, only a small quantity of pus escaped. But on introducing a syringe, and injecting some pectoral infusion, pus escaped through the ear into the mouth, accompanied by a very peculiar sensation. Great relief from the pain in the head followed immediately on this; the opening in the wound discharged a good deal of pus. The wound was dressed with dry lint, and the depuratory injections were repeated daily; in eight days the discharge had ceased, and in three weeks the wound of the integument was healed. The patient never experienced pain in the head again, and his hearing, compared with what it had previously been, was even much better (*s*)."

(*s*) Schmucker's vermischte chirurg. Schrift. III. p. 113.

☞ Two other cases which Dr. Kramer has given, illustrative of this form of disease, are taken from Dr. Abercrombie's work on the Brain, (Cases 4 and 5, first 8vo. edition;) but as this, and all the other valuable works of this distinguished physician, are in the hands of almost every British practitioner, I have not thought it necessary to give, in the present translation, the cases referred to. (Tr.)

CHAPTER III.

DISEASES OF THE INTERNAL EAR.

UNDER this head are included diseases of the labyrinth, that is to say of the vestibule, the semicircular canals, the cochlea, and the nervous expansions enclosed within these cavities. The very concealed situation of these parts, (rendering their examination, both during the life, and after the death of the patient exceedingly difficult,) together with the hitherto bad and defective mode of investigating all diseases of the ear, has favoured, in an extraordinary way, the purely speculative direction, which the study of diseases of the internal ear has, from the first, received. As the high importance of the auditory nerve, and of the cavities so curiously constructed for its immediate reception, could not fail to be perceived; so to these parts were attributed all the morbid changes that had been either observed, or hypothetically admitted, to affect nerves and bones in other parts of the body.

Thus Du Verney (*a*) believed that caries and abscess of the internal ear, relaxation, thickening, and breaking down of the "lamina spiralis" in particular, might occur; though he confesses that he has had no confirmative experience of this opinion. Lentin (*b*) pictured to himself a variety of morbid alterations, an acridity, or too great thickness of the Cotunnian fluid in the labyrinth, and the consequent injurious influence of such states on the auditory nerve, &c. &c. And Jos. Frank, Saissy, Curtis, and others have had sufficient credulity to receive, without any proof, such hypotheses as confirmed truths. Saunders admits a lymphatic effusion into the sheath of the auditory nerve, and even Itard (*c*) thinks, from the incomplete observation of a single case,

(*a*) Traité de l'Organe de l'Ouïe, p. 184. (*b*) Beiträge, &c., ii. p. 95.
(*c*) Traité, i. p. 395.

that he has sufficient reason for assuming that the fluid of the labyrinth may be dried up. He even places this dry state of the labyrinth in connexion with the absence of ceruminous secretion. But the latter occurs so very often, and is so frequently and readily cured, that it requires considerable susceptibility to the admission of hypothesis, to believe that a deficiency of the secretion of the Cotunnian fluid occurs equally often.

Of all these hypothetical diseases of the internal ear, the truth is, that in some rare cases there has certainly been found a caseous matter in the labyrinth, and atrophy of the auditory nerve previous to its entrance into the labyrinth, as well as a compressed state of the nerve from tumours, extravasation of blood, &c., in the brain. But all the alterations of the auditory nerve within the labyrinth, together with those of the liquor Cotunnii, are mere frail, uncertain creatures of the imagination, unsupported by any single post mortem observation that can be depended on. The fenestra rotunda may have been found obliterated by osseous matter, or it may have been wanting; but how can such abnormal conditions, which may possibly have been once observed, come within the precincts of practical medicine? Writers on pathological anatomy may record such rarities; but it can be only with regret that we see a practical aurist(*d*), not merely incorporate such cases in a pathological system, but even endeavour to establish their diagnosis, whilst the diagnosis of real, most important, and most frequent diseases, is altogether neglected.

The auditory nerve certainly suffers from organic disease; but the material alterations which it thus undergoes, are beyond the perception of our senses, and the reach of those means of investigation which are immediately at our command. The labyrinth also must be liable to inflammation; but certainly, only from the extension of inflammatory affections of the cavity of the tympanum, and of its bony investments. Amidst the complexity of the inflammatory febrile

(*d*) Saissy, Essai, &c. p. 237, 249.

phenomena attendant on inflammation of the cellular tissue of the cavity of the tympanum, already described, it is quite impossible to separate what, perhaps, belongs to inflammation of the labyrinth, from that which appertains to inflammation of the bony parts enclosing these cavities. It could, therefore, only be said to be acting in accordance with a theoretical systematic mode of division, if I were to place inflammation of the labyrinth under a particular head.

The only undoubted form of disease of the labyrinth, that is, of the nervous expansions contained within it, is the functional affection of these nervous expansions under the form of *altered manifestation of action,—nervous deafness. We find the hearing altered and debilitated, without any organic abnormal state in any part of the whole organ of hearing.*

This nervous deafness has hitherto been frequently misused as a cloak for ignorance and want of skill, in any doubtful or obscure disease of the ear, and, by this misuse, it has become so suspected, that we might now be ready to adopt the opposite extreme, and deny its existence altogether. This, however, would certainly be wrong. For as the absence of any organic alteration in the organ of hearing affords the first and principal ground for concluding the existence of a purely *nervous* deafness; so we must deny the competency of any one to decide on the reality of this form of disease, who does not understand the mode of investigating the organ of hearing, and especially the middle ear, by means of catheterism of the Eustachian tube. All the so-called English aurists, Curtis, Stevenson, Wright, Buchanan, Saunders, and Swan, must, therefore, in an especial manner, be denied any authoritative opinion on this subject; and to these must be added the remaining writers on diseases of the ear, Lentin, Beck, Vering, Jos. Frank, &c., not even excepting Saissy. Itard and Deleau alone, from their dexterity in the use of the catheter, form honourable exceptions.

Debility of the auditory nerve appears under two forms,

differing essentially from each other. 1. Attended by augmented irritability—erethismus. 2. With diminished irritability—torpor. Tinnitus forms the essential point of difference between the two; it belongs, without exception, to the erethitic form, whilst to the torpid form it is altogether foreign.

§ 1. *Erethitic Nervous Deafness.*

Without any previous or simultaneous morbid sensation in the ear, the patient remarks (usually in one ear alone, seldom or never in both at the same time) that there is some diminution of the power of hearing, and this is first observed on certain occasions, when sound and very acute hearing is required. Thus the incipient dulness of hearing is observed only occasionally, and the patient whose ear affords him the usual service required in ordinary life, is induced to consider the difficulty of hearing which he has accidentally remarked, as temporary, and already removed, and thus he forgets it. In the course of the following years, seldom till some months have elapsed, the dulness of hearing is remarked by the patient and by his friends, in the usual intercourse of life, either in consequence of a serious increase of the malady in both ears, or from its being perceptible in the other ear also, which had hitherto been free, and the sound condition of which the patient had availed himself of, so as to supply the place of the ear that had first become diseased. Sooner or later, noises in the ears occur, and are always most violent in the ear which had first become dull of hearing. The noises are at first of a deep-toned character, resembling the roaring and foaming of the sea; the descent of rain; the rustling of the wind among the leaves; or the humming and buzzing of insects. Subsequently, and especially when the disease is more fully established, the tones are of an acute, singing, tingling, kind, like the chirping of birds, whistling, or the singing of a kettle of boiling water; so that, generally speaking, from

these latter modifications of the noises heard, we may conclude with tolerable certainty, that the disease has attained to rather a high degree of severity.

Not unfrequently these diversified noises extend from the ear to the head, so that the patients sometimes are not only uncertain in which ear the sound exists, but even whether it be not rather in the head than the ears. Any effort of body or mind; any exhaustion whether functional or organic; as well as raw, cold, stormy weather, and a heated state of the blood, &c., increase the tinnitus in all its varieties; whilst by quiet, indulgence, serenity of mind, a mild air, and strength of body and of mind, it is diminished. It is only when the tinnitus is for the most part of a very feeble kind, that it seems to be drowned by surrounding bustle and noise, and only returns again in the midst of domestic quiet and solitude.

The same remarks apply to the patient's dulness of hearing: it is the most annoying in dull, boisterous, cold weather; after depressing passions of mind, grief, anxiety, much wine, night watching, when there is a diminution of the reproductive power, and a debilitating loss of fluids from diarrhœa, and after long continued inaction, &c.; whilst by the opposite circumstances it is distinctly diminished, and often produces a deceptive calm; so that by this improvement, though only of a transitory nature, the patient is induced to overlook the importance of his malady, and not to seek with the necessary anxiety for early and effectual treatment.

But, notwithstanding such changes, the dulness of hearing, on the whole, as well as the tinnitus, in the course of their development, become progressively worse, sometimes more rapidly, and at other times more slowly. Sooner or later, the dulness of hearing becomes so great, that not even the most strained attention on the part of the patient can compensate for his defective hearing, so that it can no longer be ascribed to absence of mind, or want of attention, if the patient does not hear well; it is necessary to repeat often what is said to him. The malady becomes trouble-

some to his friends as well as to himself, and so interferes with the duties of his vocation, that the lawyer, the teacher, and the military subaltern, &c., are obliged to abandon their professions and give up their offices. Even the quiet joys of the intimate family circle are interfered with, as all friendly conversation is put a stop to, when it can only be carried on by considerable effort of body, and by a very inconvenient approximation to the ear of the patient; and when words are deprived of all their tenderness from the harshness with which they must be uttered in order to be understood.

Distrust takes possession of the patient; he feels himself alone in the midst of his most intimate friends; and to fill up his cup of affliction, the tinnitus never for a moment leaves him, accompanies him to bed, even wakes him from sleep, and is the first thing to which his attention is called on opening his eyes in the morning; it bewilders and confuses his head, and even disturbs the free course of his thoughts.

In most cases, though not in all, the secretion of cerumen gradually diminishes, and accompanied by frequent and very annoying tickling, the meatus becomes dry, throws off large transparent scales of cuticle, and is either extremely sensitive, or, in other cases, altogether insensible to the touch, so that it seems to the patient as though the probe touched a piece of parchment. This loss of sensation extends to the whole auricle, and even to the cheek.

If, even at this stage of its development, the disease is not arrested, the faculty of hearing becomes more and more impaired, till complete deafness ensues, when even the loudest voice close to the ear is no longer heard; so that amidst the most bustling crowds of men, the patient feels himself in a state of still, melancholy solitude. With this state there is frequently associated a feebleness of smell and of sight; and I have never met with an instance in which the deprivation to which the patient was subjected by this failure of the faculty of hearing, was compensated for by the increased acuteness of any other organ of sense. His affliction affords

him but one consolation; in the latter stages of its progress to complete deafness, the tinnitus altogether ceases; as though the sensibility of the auditory nerve to the internal noise, as well as to external sounds, were equally destroyed.

Throughout the whole progress of the disease, a violent noise, especially a loud, screaming, shrill voice, is insupportable, or even painful to the ear, and peculiarly unintelligible; whilst a metallic, melodious, full-toned voice, moderately elevated, and associated with distinct, slow utterance, is agreeable to the ear, and easily understood. If the patient can accurately observe the motions of the lips of the speaker, practice, and great attention, may often, for a long time, moderately supply the deficiency of his hearing, and, particularly when conversing with individuals, may induce him to deceive himself, by supposing that his malady is not so bad as it really is. In this way it very frequently happens, that the patient continues to defer, from time to time, the period at which he seeks for help, till this is no longer possible. The patient may most certainly assure himself that he is thus dangerously deceiving himself, if he remark in large social circles, that in the midst of general conversation the voices arrive at his ear in a confused manner, and are quite unintelligible. *It is then already high time* for him to submit to judicious, proper treatment, which will not be without success.

If the patient sit in a cart which is rattling quickly over a stone pavement, or press his forehead against the frame of a window whilst a waggon is rattling past, so that the whole house is shaken by it; or if a peal of bells be ringing near the patient, or a drum be beaten; the auditory nerve becomes so excited by these deep-toned, uniform noises, that whilst they continue, the patient often hears the human voice better than a sound person, whose ear is stunned by the noise. Even this deceptive improvement, however, never continues longer than the noise itself which has produced it. Far otherwise, that is injurious, is the noise produced by horns, trumpets, cymbals, and brass instruments in general, the

tones of which are acute; the patient's hearing, is almost invariably, rendered, for a time, worse by these.

In some very rare cases, by a peculiar effort of nature, the disease remains stationary at a more or less advanced stage of its development, without our being able to say by what combination of circumstances, or what hidden internal operations of nature the patient is rendered so fortunate, and without its being possible to reckon on similar good fortune in like cases, in consequence of such isolated fortunate instances.

§ 2. *The Torpid Form of Nervous Deafness.*

This form is directly associated, in a very natural manner, with the foregoing; as it differs from it only by the total absence of any kind of tinnitus throughout the whole course of the disease; all the other circumstances attending it are absolutely identical. In this case, the patient hears with more and more difficulty, the longer the disease has existed. The difficulty gradually becomes so very great that it is, at length, impossible to make him understand what is said. All traces of ceruminous secretion vanish by degrees; though some very isolated cases occur in which it continues undisturbed, in spite of the progressive paralysis of the auditory nerve. Generally the meatus, and even the auricle and its surrounding parts, are equally deprived of their organic sensibility, in this, as in the erethitic form of nervous deafness.

In both forms of nervous deafness, I have almost always found the membrana tympani white like paper, and opaque; probably in consequence of the action of its absorbent vessels having been impaired; for loss of the special function of an organ of sense, is associated with an enfeebled state of the organic functions.

Or perhaps, and this appears to me the most probable, it is a consequence of the frequent application to the meatus and membrana tympani, of acrid oleo-ætherous and spirituous remedies.

The meatus and the Eustachian tube are, in general, free

and open, without any mechanical accumulation. When particular exceptions to this rule occur, the removal of wax from the meatus, or of accumulated mucus from the Eustachian tube, or any slight stricture of this canal, is of little or no effect in ameliorating the tinnitus and the dulness of hearing. This amelioration, when it occurs, is not in the most remote manner to be compared with the rapid, striking alteration of the whole condition, which never fails to take place, when any mechanical abnormal condition constitutes the only cause of the dulness of hearing, &c.

Although, in describing nervous deafness, I have attributed a peculiar diagnostic importance to tinnitus, it is still evident, from the description already given of other diseases of the ear, that tinnitus is by no means a characteristic symptom associated with nervous deafness alone; and therefore, particular kinds and modifications of tinnitus can never be made available, as has frequently been done under the terms *paracusis* and *hypercusis*. It is equally clear that tinnitus is not of itself a disease of the ear, but is associated with the most diversified forms of aural disease, and, indeed, often in a most indefinite and inconstant manner. Swan (*e*), Saunders, Curtis, and others have especially fallen into this error, which has been the more injurious, as on their authority, many patients solely because they suffered from tinnitus, have been, and still are treated as labouring under nervous deafness.

As absurd, and as prejudicial in its results, is the notion that tinnitus in all cases depends on sanguineous congestion in the head, and particularly in the ear; on which it really depends only in the rarest cases, and indeed, only in those of a febrile character. It is met with in accumulations of wax in the meatus, as frequently, and of exactly the same description, as in accumulations of mucus within the cavity of the tympanum, it occurs in purely nervous affections of the auditory nerve, it admits of being cured, and it is often

(*e*) A Treatise on Diseases and Injuries of the Nerves, 2nd edit. 1824, p. 267, et seq.

absent in all these affections; which is sufficient to prove, that it cannot possibly always depend on one and the same cause, and least of all on determination of blood to the ear, or on a varicose or aneurismal condition of the vascular system of this organ.

In the erethitic form of nervous deafness, the proximate cause is evidently an augmented irritability of the auditory nerve, the morbid sensibility of which is as painfully affected by the motion of the blood supplying its fibres, as the sound auditory nerve is only by an actually increased impetus of the blood during a violent febrile paroxysm. It is thus very satisfactorily explained why patients suffering under the erethitic form of nervous deafness should complain of the tinnitus being augmented equally as much by bodily exercise, stooping, &c., as by very debilitating, depressing emotions of the mind, which render the whole nervous system more irritable (*f*).

The diagnosis of nervous deafness depends solely on the most accurate local investigation of the ear. The auditory canal is free, and, in most cases, devoid of any ceruminous secretion; when, in particular cases, there is any accumulation within it, the complaints are as little increased by the presence, as they are benefited by the removal of such accumulation. *The cavity of the tympanum*, together with the *Eustachian tube*, are equally free from any accumulations of matter; that is to say, the air blown in, and almost if

(*f*) Mr. Swan believes that deafness very frequently depends on inflammatory action, which has impaired the minute ramifications of the tympanic branch of the glosso-pharyngeal nerve, which are distributed on the surface of the tympanum. Though many of the noises may depend on disordered function of the auditory nerve, he thinks they may also arise from an affection of these small branches of the glosso-pharyngeal nerve, and their communication with the sympathetic in the carotid canal. This important nervous plexus, (usually termed Jacobson's anastomosis,) is never once mentioned by Mr. Tod in his work on "the Anatomy and Physiology of the Organ of Hearing," though his acute eye has enabled him to describe as many as nine distinct muscles in the cavity of the tympanum. (Tr.)

simply breathed in, passes distinctly, and without any effort, to the middle of the Eustachian tube, and even up to the membrana tympani. The declaration of the patient on this subject must not, however, be considered sufficient, in order to establish our opinion; the air-douche alone, by its objective mode of action, completely answers our purpose, and this may, and must be made, a certain diagnostic means. On applying our ear close to that of the patient, *the stream from the air-press is heard to rush into the cavity of the tympanum, and strike against the membrana tympani*, and passing through this to issue, as it were, out of the ear of the patient, into that of the observer. Immediately after this examination, the patient remarks (and this is a *positive* sign of nervous deafness) *that the deafness, as well as the tinnitus, are decidedly increased, are rendered worse, though only for some hours, or even merely for a quarter of an hour; the head becomes confused, and the ear seems as if it were stuffed.* The greater the erethismus of the auditory nerve, and the more powerfully the air rushes into the ear, the more striking and the more permanent is its injurious influence. If the erethitic condition of the auditory nerve be associated with more or less mucous engorgement, or stricture of the Eustachian tube, the action of the air-douche does not render the patient worse, which occurs only when by this means both the mucous engorgement and the stricture have been removed, and even a certain degree of amelioration of the hearing and of the tinnitus has been effected. But this amelioration becomes stationary, as soon as the air at length rushes against the membrana tympani, without any gurgling, in a clear full stream. A deterioration again takes place, when the air-press is used with force, after the occurrence of the above-mentioned alteration in its mode of action on the ear; the same phenomena are then produced which have already been described, as occurring in the pure simple form of nervous deafness. If the disease be of an erethitic character, the action of the air-press is, in this case, much more striking than in the torpid form, though even

here it never fails to be observed, if the stream of air be only used with a moderate degree of force.

The improvement remarked by the patient when riding in a coach, or during loud noises in general, might also be considered diagnostic, but this is neither decisive, nor to be depended on; as this again is merely a subjective symptom, which considered by itself affords no conclusion.

Swan (*g*), and others (*h*) think that nervous deafness ought to be admitted, only when the patient actually no longer *hears anything whatever*. In their opinion it is too much, if tones are still heard which are merely communicated to the ear by means of the temporal bone, or any other solid conductor; so that they require for nervous deafness a total inability of the auditory nerve to perceive sound, that is, an actual paralysis of it. This is evidently an error: complete nervous deafness certainly depends on paralysis of the auditory nerve; but every nervous difficulty of hearing need not necessarily proceed to paralysis, or have already advanced thus far, though it may go to such an extent; an occurrence, however, which is fortunately very rare. All the gradations of the capacity possessed by the auditory nerve for the perception of sound, which are included between the state of perfect soundness and that of confirmed paralysis, belong (subject to the above results of a careful local investigation) undoubtedly to nervous difficulty of hearing.

The duration of the disease is always very chronic; it never developes itself suddenly; its first advances are made gradually and imperceptibly up to that point at which the attentive patient becomes aware of his malady; its progress from year to year, or even from month to month, is striking; for a time it is arrested or accelerated in its progress by the favourable or unfavourable condition of the patient, or the circumstances in which he is placed, and it is but *very seldom* that it stops short at a more or less advanced stage of its

(*g*) A Treatise, &c., 2nd ed. p. 267.
(*h*) Hecker's Annalen, 1834. März-Heft, p. 337—354.

development, in consequence of some arbitrary effort of nature, which does not admit of being more accurately defined. Whether the patients were from sixty to ninety years of age, or whether they were not more than twenty, I have invariably found them to complain of the constant increase of their malady. Great variations in the degree of difficulty of hearing do not occur, but slight degrees of amelioration and deterioration are frequent, though of very transitory duration.

Hereditary predisposition is indubitably the most important predisposing cause of the disease; probably a third part of these patients could refer to a similar affection in their parents, or brothers and sisters; whence it is easy to understand why persons of otherwise strong constitutions, should frequently be affected with this debility of the auditory nerve. Farther, I reckon among these causes a general state of debility of the whole nervous system; in consequence of which even transient injurious influences act prejudicially on the auditory nerve. Finally, very advanced age naturally (though not indeed in all people) diminishes the vital power of the auditory nerve, which then usually falls into a torpid state.

The principal exciting cause of the disease is considered to be cold, though only in the opinion of the patients, who cannot usually give any accurate account of the time, kind, and manner of origin of their affection. All debilitating influences act in a very distinctly injurious manner, such as distress, care, grief, much wine, night-watching, vexation, &c., the continued action of cold, washing the head and ears with cold water, exhausting evacuations from frequent blood-letting, both general and local from behind the ear, diarrhœa, onanism, long-continued quiet, nervous fever, protracted suppuration from setons, issues, &c. Convulsions, difficult dentition, tooth-ache, diseases arising from worms, &c. have been included among these exciting causes, but with little propriety. I must not, however, omit to notice violent concussions of the head; for I have even seen

instances in which complete deafness succeeded to loud explosions of fire-works, artillery, &c.

A prognosis with regard to nervous deafness in general cannot be given; it must essentially depend on the degree of development which the disease has attained in particular cases, on the age of the patient, and the manner in which the disease has already been treated. There is very little hope of improvement, even of slight improvement, whenever the dulness of hearing has attained to so high a degree, that a watch, which is *heard by a sound ear at a distance of thirty feet, is scarcely heard when applied close to the diseased ear, or even not heard then;* and farther, whenever the disease has attained to this high degree in both ears, and the patient is already far advanced in life, and such conditions of his constitution and external circumstances prevail as cannot be removed, and which continually renew the disease. The more numerous are these aggravating causes which meet in the same patient, the more gloomy are the prospects of any improvement. The period most favourable for treatment is that under twenty years of age; beyond this age the sensibility of the auditory nerve to external salutary impressions is constantly diminishing, and along with this the most favourable condition for deriving improvement.

This improvement is also extremely limited, in consequence of the morbid condition of the auditory nerve, (especially in the erethitic form of nervous deafness,) never admitting of more than a very gentle action of invigorating remedies; and the period at which we can expect to derive any results from these remedies is the more distant in proportion as the assemblage of other conditions in general prevent their being attained; *i. e.* not till after the treatment has been pursued for months. After the consideration of these multifarious circumstances, which demand serious reflection, it is evident that we should never be induced to give a decided opinion as to what degree of improvement is to be obtained by treatment, or what evident advantage the patient is to derive as to his condition, from the improvement

actually obtained. Patients very often enter on the treatment with too high expectations, and in the course of it forget altogether how small was the prospect of success, which the well-informed practitioner had beforehand led them to expect; whilst at the termination of the treatment, they imagine, that, from its long continuance during many months, it ought to have afforded important results. I have, therefore, made it a rule, in every severe case, to put down on paper the more or less unfavourable opinion which I may entertain respecting the result of the treatment, and to hand this to the patient, with the request that he will preserve it, by which means, at the close of the treatment, all reproaches, whether expressed or not, are with certainty avoided.

The prognosis is the worst for those patients who have already undergone severe debilitating modes of treatment for their complaint, such as shatter the whole nervous system, and the auditory nerve in particular. Among such modes of treatment are included setons, issues, and sea-bathing, but above all, electricity, galvanism, and mineral magnetism; for by these the morbid sensibility of the auditory nerve (especially in the erethitic form of nervous deafness) is so augmented, that it is over-excited even by the most cautious mode of treatment, and all prospect of amelioration is generally lost.

If the erethitic and the torpid forms of nervous deafness be compared in a prognostic point of view, the former is the less favourable for medical treatment; as in this form the excited irritability renders it absolutely necessary to proceed with far more caution, and in a mode that requires longer time for any amelioration.

The improvement acquired is not endangered by the daily use of the ear in the ordinary circumstances of life, but it may be by severe nervous fever, violent colds, and depressing affections of mind, &c. The greater the improvement, and the more thoroughly it has become established by a lengthened course of treatment, the less occasion is

there to fear these injurious and dangerous circumstances. The treatment of nervous deafness should therefore never be continued for less than three months; the longer it is persevered in beyond this period, the more important and the more permanent is the result.

Even when the disease has proceeded so far, that it cannot be perceptibly improved, the patient should still submit to a cautious appropriate plan of treatment, in order to overcome the tendency of the disease to become progressively worse; and in order to preserve, at least, what remains of the power of hearing, which, without this assistance from art, is for ever lost.

Both as regards the treatment and the diagnosis, the English practitioners have departed the farthest from the right path, though they maintain that they have derived brilliant results from their plan. The cautious declaration of Cleland (*i*), "Nervous deafness I leave to the learned gentlemen of the faculty," has not been responded to by his countrymen. With unheard of audacity, in *doubtful* cases of nervous deafness, Curtis recommends purgatives (especially calomel) to be given as long as the patient's strength permits. In well marked instances of nervous deafness, that is to say, such cases as Curtis, with his extremely deficient knowledge of diseases of the ear, concluded to be nervous, he recommends blisters, an antiphlogistic diet, *calomel again, and sulphate of magnesia.* At the commencement of nervous deafness, Swan (*j*) gives calomel every night, and sulphate of magnesia with jalap, during the day; applies leeches behind both ears, once a week; and enjoins abstinence from spirituous drinks and animal food. If there be evidence of still greater determination of blood to the head, he bleeds, lest the patient should die apoplectic. Wright (*k*) advises the use of rhubarb, aloes, senna, and sulphur; and if no good is derived from these, the patient is to have recourse

(*i*) Philos. Trans., 1740—41, p. 848, seq.
(*j*) A Treatise, &c., p. 269.
(*k*) On Nervous Deafness, p. 78.

to a regular plan of medical treatment. Saunders (*l*) employs leeches, strong purgatives, and finally bark, in order to dissolve and dissipate the hypothetical serous effusion within the sheath of the auditory nerve. Buchanan (*m*) thinks reliance is to be placed on alterants, blisters, setons, and saline purgatives. All these remedies are as inapplicable to the true character of nervous deafness, as the diagnosis of the disease by the above-mentioned practitioners is devoid of the least claim to be considered as well founded.

Almost equally objectionable are the curative methods recommended by Beck, Vering, Jos. Frank, Saissy, and others, from which, however, these practitioners certainly would not have expected to derive any advantage, had they had at their command a more correct diagnosis of nervous deafness, and better marked cases.

Deleau abstains altogether from the treatment of nervous deafness. He ventured not to enter on the path struck out by Itard for a rational mode of treating this form of disease, but which even Itard, after timorously advancing a few steps, again quitted. The first case which Itard (*n*) adduces as "essential paralysis of the auditory nerve," is so incomplete, and so imperfectly diagnosticated, (inasmuch as he never once investigated the Eustachian tube,) that it is impossible to decide what particular morbid condition he had to treat, and therefore equally impossible to know how far the internal administration of steel, or the application of the actual cautery to the mastoid process, effected *an* improvement. This case must, therefore, be struck out. The second and last case which Itard details, is equally devoid of all local investigation of the ear (*o*); and on general grounds alone, which are here of no value whatever, is adduced as a kind of paralytic condition of the auditory nerve. *I may, therefore, boldly affirm that, hitherto, in no work is there to be*

(*l*) The Anatomy, &c., p. 87.
(*m*) Synoptical Table, Genus xi.
(*n*) Traité, &c., ii. p. 323, 345.
(*o*) Traité, p. 349.

found a single accurately and carefully diagnosticated case of nervous deafness; and therefore that, hitherto, no proper mode of treating nervous deafness has existed. The proposals which Itard has made in reference to this subject, are merely theoretical projects, unconfirmed by practice, and still remain in their original crude state, precisely because he was not able accurately to decide what cases belong to the head of nervous deafness.

In the treatment of the disease, attention must, undoubtedly, be paid, in the first place, to the general state of health. It would be inconsiderate indeed, were we to attempt the removal of a topical debility, before having remedied any general debility of the whole nervous system, and of the digestion, which may be simultaneously existing; or any irregularity of the bowels, and of the menstruation, and even of the mental functions. But we are not to flatter ourselves that by the fulfilment of these general indications, nor even by a complete restoration of the general state of health, in the least degree to improve the topical affection of the auditory nerve, although under such favourable conditions of the general health, the tinnitus, as well as the difficulty of hearing, become more tolerable to the patient, or appear to be so.

When, therefore, the general indications have been as completely as possible fulfilled, or if the patient's general health be, as is often the case, perfectly good, we must immediately turn our attention to the topical treatment of the diseased auditory nerve. It would be useless to endeavour, by means of blisters, setons, issues, tartar emetic ointment, the actual cautery, moxa, electricity, and similar remedies, to re-excite the extinguished vital power of the auditory nerve, or to remove by derivation any acrimony or inflammatory irritation, with which it may be hypothetically imagined to have been affected from metastasis. All these remedies, so powerful in their action, indubitably increase the particular morbid condition to so great a degree, that they often render it incurable, and make it approach nearer to paralysis.

Equally unfavourable have been the results of the attempts that have been made with aromatic fomentations, the application of bread-crumbs soaked with volatile oils, spirituous drops, and irritating ointments, introduced into the meatus; the result of these inconsiderate curative attempts is inflammation of the meatus and of the membrana tympani, the latter becomes opaque, its delicate texture completely changed, and thickened; the hearing, at the utmost, only appears to be, for a time, somewhat more acute, as a result of the inflammatory excitement of the membrana tympani, along with which the deceptive improvement of the hearing vanishes, to give place to still greater deafness than before. Other practitioners have thought, by means of Russian, salt water, sulphur, chalybeate, and other baths, medicated with various vegetables, and even by cold water affusions, to give the proper degree of excitement to the auditory nerve, (the debility of which was never more than guessed at by them,) and believed that the action of these remedies might and ought to be supported by the internal administration of tonic medicines, such as preparations of iron, bark, arnica, asafœtida, &c. But even by this mode of procedure, an injurious degree of excitement, and an increased consumption of that portion of vital power which the ordinary nerve may still retain, is the inevitable result of the violent congestion thus occasioned; the tinnitus and difficulty of hearing are evidently augmented.

The topical treatment of the auditory nerve must be undertaken in a far more delicate manner, and with far more forbearance than has hitherto been attempted, excepting by Itard. Itard proposed to introduce ætherous vapour into the middle ear by means of the catheter, and to generate this vapour in an apparatus in which the acetous æther is dropped on a saucer of red hot iron, by the heat of which it is vaporised. But the æther is decomposed by the red hot iron, so that the apparatus does not introduce into the cavity of the tympanum ætherous vapour, but an acrid,

very irritating kind of gas, which is well suited to the torpid form of nervous deafness, but not at all to the erethitic form, in which its action is positively injurious. Equally prejudicial is the action of carbonic acid gas, carburetted hydrogen gas (with carbon in excess), and hydrogen gas, either pure or mixed with atmospheric air and ætherous vapour, when introduced into the middle ear; so that, from my own experience of these gases, I should venture beforehand, to reject any trial of oxygen gas, and other species of gases, as positively too irritating. The attempt to vaporise acetous æther in a flask, placed in warm water, and connected by means of a tube with the cavity of the tympanum, belongs also to the same class of methods, which act in too irritating and injurious a way, because the vapour is here given off far too rapidly. This serious inconvenience I have remedied in the following manner. A large glass flask, holding about ten quarts, is firmly and closely stopped with a cork, (*vid.* fig. 6,) through which are passed two brass tubes, each provided with a cock; one of these tubes is connected above with a funnel for dropping in the fluid, and the other with an air-tight tube, destined to conduct the vapour generated and enclosed within the flask, into the cavity of the tympanum.

When the apparatus is to be used, the cork is to be firmly fixed into the neck of the flask, with the two tubes attached, the cocks of which are to be closed; the proper quantity of æther is then to be poured into the funnel, and forced into the flask by a gentle expiration, where, by virtue of its own fluidity, it is converted into a thin vapour, at the ordinary temperature of the room. This vapour fills the interior of the flask in an equable manner, and is, indeed, in a state of slight condensation, so that having connected the metallic tip of the tube with the catheter, on opening the cock, the vapour flows out with an audible whizzing sound. In order to restrain the escape of the ætherous vapour (in a mode very imperceptible indeed, but quite adequate) throughout the sitting, water should be allowed to flow through the

funnel into the flask, by means of which a number of cubic inches of ætherous vapour are displaced, equivalent to the quantity of water flowing in. By this contrivance, not only is the original peculiar nature of the ætherous fluid retained, since its state of cohesion alone is altered, but we also have completely under our control the quantity of vapour issuing, and the intensity of its action on the affected organ; inasmuch as we can very readily and accurately regulate the quantity of æther and of water to be poured in, and also by means of the cock attached to the tube giving exit to the vapour, the quantity of the vapour flowing out. The higher the state of erethismus of the auditory nerve, that is to say, the more violent and the more acute in tone is the tinnitus, the more confirmed is the attendant deafness, and the sooner a simple stream of vapour passing into the cavity of the tympanum, augments both these complaints, the less æther is to be used at each sitting, and the more moderate must be the force with which the stream of ætherous vapour issues. It must always be kept in view that the cavity of the tympanum, which first receives the ætherous vapour, is extremely small, and that even when the vapour passes through this cavity into the labyrinth, by means of the foramen ovale, it has to fill an equally small, or even still smaller space, than that formed by the cavity of the tympanum. It is unnecessary to make use of warm water to pour into the flask, for the ordinary temperature of the room is sufficient to vaporise the æther.

Of all kinds of æthers, the preference is beyond question due to acetous æther, on account of its extreme mildness. Sulphuric æther, ammonia (especially in conjunction with camphor), ætherous oils, tincture of coffee, and the like, have always over-excited the auditory nerve, even in my most careful trials of them.

Having previously introduced the catheter through the nose into the mouth of the Eustachian tube, in the manner described above, (part ii. chapter ii.) and placed it in connexion with the tube of the vapour apparatus, the patient is to sit near a

table, and leaning his arm on it, with the corresponding hand he is to hold the tube of the apparatus, in such a manner that it will remain in close accurate connexion with the catheter.

Each single sitting, before the vapour apparatus, occupies a quarter of an hour, and is daily repeated, alternately applying the vapour to the right and to the left ear. It would be too much to attempt to apply the vapour to both ears daily, though it should certainly be used daily to one ear, when for any reason we may wish to treat one ear alone.

During and subsequently to each sitting the patient should carefully observe whether the tinnitus is at all increased; in that case the action of the ætherous vapour must be in every respect diminished. It is certainly a very good sign when the hearing is better after the operation, than before; but the position cannot be reversed, for many patients, by the pressure of the frontlet as well as by the annoyance of the whole process, (though this is but trifling,) are in some measure excited by it, so that their hearing is often rather worse after the operation than before. But this deterioration does not usually last more than half an hour, and often not so long. If, however, this should not be the case, and the hearing should be much more permanently and decidedly diminished, and the tinnitus in a corresponding degree increased; the quantity of æther used should, in the first place, be diminished even to a single drop, the vaporisation of which is always perceptible by an acute nose. But if no different result is obtained from this very gentle action of the vapour, the treatment must be interrupted, until the deterioration which has occurred has completely vanished, and given place to the former condition. On the occurrence of this, the same treatment must be re-commenced in the most gentle manner; but the patient must be considered as incurable if, on this renewal of the treatment, the same deterioration is induced, as after the first remedial attempt.

In general, the hearing is improved, and the tinnitus diminished, even during the sitting, so that after a period of

fourteen or even eight days, there may be observed a progressive increase of the distance at which the watch is heard. This increase is naturally the more striking, the more favourable are the circumstances associated with the improvement, the younger the patient is, and the less confirmed is the disease.

To render the treatment as effective as possible, the sittings should follow each other in an uninterrupted series every day, they should not even be interrupted in consequence of the recurrence of the catamenia, unless the tinnitus should, in particular cases, become troublesomely increased during this short period. Advanced pregnancy necessarily interrupts the treatment. During the whole time that he is under treatment, the patient must avoid every thing that debilitates the nervous system, or which might give him cold in the ear, or that, by the extension of severe catarrhal complaints to the mucous membrane of the Eustachian tube, might render difficult or impossible the entrance of the vapour into the middle ear. In this case, the treatment must be discontinued until the passage again becomes so completely free as to admit the slightest breath.

The method of procedure just described is not at all adapted to the *torpid form* of nervous deafness, in consequence of the necessity for greater excitement which exists in this form. A method which acts more powerfully must therefore be had recourse to, and this we are put in possession of by means of Itard's apparatus and the decomposition of the æther which it effects. Itard's apparatus, however, has this inconvenience, that the metallic saucer becomes cool more than once, during a single sitting, and requires to be taken out and exchanged for a hot one; and farther, the temperature of the vapour generated, never remains for a moment the same, but varies extremely; for immediately after the insertion of the red hot saucer, the vapour issues burning hot into the ear, and in a few minutes sinks to a very low temperature.

Both these evils I have remedied in the following manner.

The floor on which the bell-glass of the apparatus rests, is substituted by a thin metal plate, which is warmed, according to pleasure, by an oil lamp placed underneath, so that the ætherous fluid falling on it, is thus converted into vapour, which passes out by a tube attached to the apparatus, and is conducted by the catheter into the middle ear. Through the cover of the apparatus, a thermometer, with a metallic scale, passes down almost to the bottom, and indicates the temperature at which the ætherous vapour passes into the ear.

In the torpid form of nervous deafness, also, the sittings for the introduction of ætherous vapour into the middle ear, should take place every day; each ear being acted on on alternate days. The operation may, however, be protracted for more than a quarter of an hour. The power of hearing ought to improve distinctly after each sitting, unless an immoderate sensitiveness of the head to the pressure of the frontlet, should mark the improvement for a short time after the operation.

Other circumstances connected with the treatment are in general the same as in the treatment of the erethitic form of nervous deafness; even the preference to be given to acetous æther over all other ætherous fluids, is as decided in the one case as in the other.

Case LVI. Miss M. Wolf, aged eleven years, in other respects perfectly healthy, had been affected for years, (without being able to refer it to any distinct cause,) with difficulty of hearing, and tinnitus of both ears, for which no remedies had hitherto been employed. I found both the external meatus, as well as the Eustachian tubes, sound; injections of tepid water into the middle ear excited violent pain, which lasted till late in the evening. With the left ear she heard my watch at a distance of six inches, and with the right ear at a distance of two inches only.

In the beginning of January, 1832, without employing any other remedy, ætherous vapour was introduced daily

into the middle ear of the right and left side alternately; six drops of acetous æther were poured into the apparatus each time, and during each sitting a pint of water was used. After four weeks, the tinnitus ceased, and only returned occasionally for a short time, after violent bodily exercise; during the sittings very slight pricking pain was occasionally experienced in the membrana tympani. The treatment was persevered in without interruption for four months; the patient remained in good health; she had no occasion to make the slightest change in her ordinary mode of life, and at the close of this period, she was delighted to find that the hearing distance had increased on the left side from six inches to eight feet, and on the right from two inches to six feet.

A summer's residence in the country broke off the treatment for nine months, in which time the improvement acquired was not in the least degree diminished, though during this period menstruation occurred for the first time, attended with rather severe symptoms. In the beginning of January, 1833, the same treatment was renewed, and was persevered in for five entire months, with regular progressive improvement of the hearing distance, so that, after this period had elapsed, the patient heard my watch at a distance of full thirty feet, and was dismissed as perfectly cured. The tinnitus had never in the least re-appeared.

The history of this case is particularly interesting, as it shows distinctly the decisive action of my simple method of topical invigoration of the ear; but it also proves that, even under the most favourable general conditions, that is to say, extreme youth, good general health, &c., it is only by great perseverance that nervous deafness is completely cured.

Case LVII. Mr. Greulich, of Potsdam, sixteen years of age, in other respects in good health, had suffered from childhood from difficulty of hearing and tinnitus in both ears. The mode in which the disease commenced is involved

in obscurity; all that is known is, that it has increased from year to year, notwithstanding that blisters, leeches, purgatives, fomentations, and injections of all sorts into the meatus, have been abundantly employed. I found the external meatus completely sound, not even without the requisite quantity of cerumen, and the Eustachian tubes free and open. The patient complained of a noise before the right ear, resembling the chirping of birds, and of a less constant buzzing before the left ear. With the left ear he heard my watch only when placed in contact with it, but with the right he could still hear it at a distance of six inches. In 1833, the patient submitted to local treatment of the ear by means of ætherous vapour, persevered in for four months, and with such success, that the tinnitus entirely vanished, and the hearing distance increased, on the right side, from six inches to seven feet, and on the left, from immediate contact with the ear, to eight inches. Having returned to Potsdam, he took cold, and suffered from catarrh of the Eustachian tube, with copious mucous accumulation, and considerable deterioration of the hearing; but a few sittings before the air-press removed the mucus, and completely restored his hearing. As, however, these catarrhal relapses frequently returned, in spite of the most invigorating mode of life, the patient made use of the waters of Marienbader for six weeks, and of the air-douche occasionally, as an after treatment, and was thus completely freed from these annoying disturbances. He has now for more than a year continued in undisturbed possession of that improved condition of his erethitic nervous deafness which he originally acquired.

Case LVIII. Mr. Lawrence Lorck, of Königsberg, in Prussia, sixteen years of age, of a feeble and rather scrofulous constitution, with great tendency to syncope, has suffered, since eight years of age, from buzzing in his ears and difficulty of hearing, the gradual imperceptible increase of which cannot be referred to any distinct cause, excepting

that several elder members of his family also suffer from difficulty of hearing. For three successive years he had recourse to sea-bathing, without any advantage. In 1833, the right ear heard my watch only at a distance of three inches; the left, on the contrary, still at a distance of four feet. The right meatus was sound; in the left, there was found, near the membrana tympani, a red excrescence, of the size of a pea, which secreted a tolerable quantity of purulent matter. Both the Eustachian tubes were completely free to the passage of air.

The small polypus disappeared after a few touches with lunar caustic, and along with it the discharge; for the other complaints the patient made use of the ætherous vapour-douche exclusively, continuing it uninterruptedly for five months. At the termination of the treatment, in the course of which no particular interruption occurred, the buzzing in the left ear had entirely ceased, and that in the right so far diminished, that it was only noticed by the patient when he paid attention to it: the hearing distance had increased on the left side from four to fourteen feet; and on the right, from three inches to four feet. In December, 1833, the patient returned from Berlin to Königsberg, where he suffered from catarrh of the middle ear, brought on by cold, and attended by great deterioration of the hearing of both ears, which, however, disappeared in the course of a few weeks, without any farther artificial aid. The usual strong tendency of such catarrhal affections to return, still remained, however, in this instance also; in consequence of which, every time he took fresh cold, the improvement of the nervous difficulty of hearing that had been acquired, was disturbed; nor will this be thoroughly established till the patient shall have made use of those means for the cure of catarrh of the middle ear, which have already been pointed out. Unfortunately, he has not yet been able to return to Berlin; whilst in Königsberg, as far as I know, the means are wanting for really effecting what may certainly be accomplished. Case LVII., exactly similar to the present

one, affords the best proof how decidedly this catarrhal complication may be remedied, when the proper mode of procedure is understood.

Case LIX. Miss Von Pannewiz, of a very strong constitution, has suffered for many years from difficulty of hearing and buzzing in both ears, the latter being strikingly increased by any bodily exertion, and even in eating. Her head was thus rendered confused and bewildered, and her mind depressed, especially from having submitted to so many curative attempts for years past, by means of Russian baths, acrid drops and injections into the ears, and electricity, without deriving any benefit whatever; her malady having been rendered even worse. The patient was not aware of any particular cause that had given rise to her malady; it had commenced very imperceptibly, and by a gradual undisturbed progress had attained to such an extent, that, with the left ear, she could hear my watch only at a distance of two inches, and with the right ear, only at the distance of four inches. I found the meatus sound, the Eustachian tubes open and free, but the auditory nerve so sensitive, that even blowing into the ear materially augmented the confusion of the head and the difficulty of hearing, though only for a time. A sensation, resembling the firm pressure of a finger in the ear, was particularly annoying to the patient. Against these complaints I employed the ætherous vapour-douche exclusively, applying it daily for three months and a half; and in the course of this period I had the satisfaction to find the head completely relieved of the very troublesome confusion, and the ears from the sense of pressure, as well as from the tinnitus, so that the hearing distance improved from two inches to two feet, on the left side; and on the right, from four inches and a half to three feet, attended by remarkable alleviation of the hearing as regarded all relations with the external world. The result, in this instance, is the more deserving of consideration, as hitherto, in all patients whose ear has been submitted to the

action of electricity, every effort for the restoration or improvement of their debilitated hearing has been vain. Unfortunately family affairs prevented the patient from staying longer in Berlin; but notwithstanding, in the course of the next month, that consecutive influence of the treatment, which hardly ever fails to occur, was, even in this instance, productive of a still farther spontaneous improvement of the hearing.

Case LX. Madame Jacobs, of an extremely strong, but almost too plethoric constitution, and of a family several members of which had also suffered from difficulty of hearing, had since her last accouchement, five years ago, been attacked annually with erysipelatous inflammation of the right auricle, which had affected the eyes, and left them subject to an obstinate affection, which only yielded to salt-water baths again to attack the auricle. During this time, abscesses frequently formed in the left meatus, accompanied by severe pain, and which burst on making use of Russian baths. On this account, in 1833, she went to Tœplitz, where, as regards the external affection of the ear, she obtained the desired relief, whilst the previously existing tinnitus was augmented by the hot baths, and the difficulty of hearing not at all improved. In 1834, I found the meatus sound, no absence of ceruminous secretion, and the membrana tympani clear and transparent. The *right* Eustachian tube was completely free, but it was not till after ten sitttings before the air-press, that the air passed up to the membrana tympani on the *left* side, and then only when the stream of air was of considerable power. On the *right* side there was no tinnitus, and the hearing distance was four feet; on the *left* side the tinnitus was constant, and the hearing distance only two inches. I began the treatment of both ears with the ætherous vapour-douche on the 12th of June. Up to the 12th of July the tinnitus had entirely disappeared, and notwithstanding the great heat of the weather, it did not again recur till the 16th of August, and then, indeed, only as the

result of a very painful inflammatory swelling of the gums of the upper jaw. A few weeks after, it had again entirely ceased, but returned, and at length remained permanent, though less severe than before, notwithstanding the marked improvement of the hearing. By an uninterrupted treatment of five months' duration, up to the 12th of November, by means of the ætherous vapour-douche alone, the hearing distance increased from two to thirty inches on the left side, and from four to nineteen feet on the right side, so that the improvement was very marked. This important improvement, in conjunction with the very advanced period of the year, was sufficient to induce the patient to terminate the treatment, the result of which, had it been still farther persevered in, would certainly have been still more brilliant.

Case LXI. Miss Wendt, of Crossen, in good health, but very subject to sore throat from colds. From frequent attacks of angina tonsillaris, the tonsils had become very much enlarged. For some years past, these inflammatory affections of the throat had not recurred. Instead of these, however, violent tinnitus, attended by striking difficulty of hearing, had occurred. For these she had in vain had recourse to vapour-douches to both meatus, Russian vapour-baths, issues, several bleedings, leeches, acrid drops, and other similar remedies; the complaints continued during the year to increase in severity. In January, 1832, with the right ear she heard my watch at the distance of half an inch only, and with the left ear not at all; in both ears she complained of violent buzzing, resembling the simmering and boiling of water. Both external meatus were sound, as well as the right Eustachian tube; but on the left side, the air did not pass up to the membrana tympani; aqueous injections into the right Eustachian tube excited, for a time, violent pain in the ear and greater difficulty of hearing; the water passed through the left tube only after several sittings, and then was accompanied with distinct though very trifling

complaints. From this time the canal continued open, without the hearing being at all benefited.

This case of erethitic nervous deafness, I treated at first, by introducing carburetted hydrogen gas into the middle ear, afterwards pure hydrogen gas, and finally a mixture of hydrogen gas and atmospheric air; but as the tinnitus was thus altered in character, and resembled a fine tingling sound, and the hearing was rendered still worse, I speedily had recourse to ætherous vapour. After a three months' constant employment of these douches, without the collateral aid of any other means, the tinnitus became very distinctly calmed, and the hearing consequently improved, so that the watch was heard on the right side at a distance of two inches instead of half an inch, and at the distance of an inch on the left side where it was previously not heard at all. After a delay of four months, during which time no injurious change had occurred in the improvement, the sittings were commenced afresh, and were continued uninterruptedly for five months, up to the middle of February. At this time the tinnitus had almost entirely disappeared, and the hearing had improved from two to ten inches on the right side, and on the left from one to six inches. A second interval of two complete years had not at all altered the improvement, which, notwithstanding its apparent trivialness, was of very considerable influence in facilitating all the social relations of the patient, since the difficulty of hearing had previously been so very great. In the beginning of 1835, however, a temporary deterioration of the hearing occurred for a short time, in consequence of a catarrh of the Eustachian tube, which, however, after making use of a mixture of sal ammoniac, yielded to the air-douche. The patient now again submitted to the use of the ætherous vapour-douche, for the third time, from the 3rd of March till the 15th of April, which, even in this short period of time, six weeks, (private affairs preventing the treatment being continued longer,) increased the hearing distance from ten to twelve inches on the right side, and from six to eight inches on the

left. The tinnitus was so trifling in both ears, that it was hardly noticed, and no longer at all disturbed the patient.

Case LXII. Mr. Delius, a native of Bremen, twenty years of age, in general of very good health, though subject to frequent faintings, has suffered, for about four years, from difficulty of hearing of both ears, attended by low-toned tinnitus, ceasing now and then for some hours, and considerably augmented by any violent bodily exercise. The affection in this case cannot be at all attributed to hereditary predisposition, nor is there any other cause known to which it can be referred. The hearing evidently became more rapidly worse than before, while the patient made use of the sulphur baths of Eilsen, and submitted his ears to the vapour-douches of the same place. Bleeding, leeches, purgatives, galvanism, and so forth, had proved of as little use. I found both meatus filled with dark brown cerumen, the removal of which, however, did not in the least improve the hearing. Both Eustachian tubes were permeable to the air-douche: my watch was heard alike by the right and left ear, at a distance of ten inches. Without at the same time having recourse to any other remedy, I began, on the 12th of May, the application of ætherous vapour-douches, which were repeated every day for five entire months, during which time the tinnitus, indeed, was not materially altered, but the hearing improved from ten inches to six feet, and by continuing the treatment still longer, a proportionably increased improvement may assuredly be anticipated.

Case LXIII. Mr. Brodbeck, twenty-three years of age, enjoying in other respects very good health, has suffered for the last six years, in consequence of a violent cold, from great difficulty of hearing, attended by very troublesome tinnitus, resembling the rumbling of a distant waggon. Every fresh cold increased these complaints, which have hitherto obstinately withstood blisters, hot vapour-baths, fish-oil,

and the oil of Dr. Méne Maurice. I found both meatus sound; the membrana tympani transparent and polished; the Eustachian tubes completely free and open; but so sensitive was the ear, that a stream of air of only moderate force excited a striking degree of numbness, especially in the right ear, which only disappeared completely, after eight days. With the right ear he could still hear my watch, but only at a distance of one and a half inches; with the left ear, however, it was no longer heard at all. After giving a very unfavourable, doubtful prognosis, I carefully commenced the application of ætherous vapour-douches, the action of which, even after the first sitting, was followed by a very remarkable alteration of the tinnitus. But after the fifth sitting the scene was changed; the tinnitus again increased, and during the eighth sitting, (though only two drops of acetous æther were poured into the apparatus,) so seriously, that the sitting was not continued. After a pause of several weeks, the original condition was re-established, but every new attempt again to make use of the æther vapour-douche (though only one drop of acetous æther was used, the vapour of which was distinctly smelt by the patient) was followed by the same deterioration, so that I was obliged to abandon even this extremely delicate and mild mode of treatment.

Hoping that the magnetic fluid might probably be found a still milder agent, I advised the patient to submit to the magnetic treatment of Dr. B. of this place, which indeed, in the first four sittings, induced a diminution of the tinnitus, and improvement of the hearing, similar to that which I have described as following the application of the ætherous vapour; but in the next four sittings, all this was again so completely lost, that the patient becoming alarmed, left off the treatment. Immediately after this, I found the membrana tympani very much reddened, and this redness did not disappear till some days subsequently. Such a state of augmented excitability of the auditory nerve, in which the use of the vapour-douche with only a single drop of

acetous æther, is attended by a morbid increase of the symptoms, must undoubtedly be considered incurable.

Case LXIV. Miss Von Grunen——, in perfect health, sixteen years of age, is said to have suffered when one year old, from inflammation of the brain, and from that time, from difficulty of hearing. In the spring of 1830, I found the meatus and the Eustachian tubes perfectly free; but with both ears the patient could hear my watch only at a distance of one foot. For the sake of investigation, I injected tepid water into the cavity of the tympanum, which gave rise to weight and pain in the ear, and increased the difficulty of hearing. The patient had never had tinnitus, so that, in this instance, the nervous deafness was of the torpid form. The treatment was, however, deferred till the autumn of the same year, during which time the hearing distance sank from twelve to six inches, in which circumstances, any reason for still farther delay yielded to the urgent danger of progressive deterioration. The treatment was commenced, and the ætherous vapour introduced into the middle ear, by means of the original, and very inconvenient, apparatus of Itard; the right ear, however, was alone treated, as the patient refused to allow the catheter to be introduced into the left tube: unreasonable as this refusal was, it afforded me an interesting opportunity of observing the sympathetic re-action of the one ear on the other. The sittings took place every day, the ætherous vapour being introduced exclusively into the right ear, where it excited a perceptible gentle degree of warmth, and slight pricking in the membrana tympani. After the treatment had been pursued for three and a half months, notwithstanding that it was employed on one side alone, there was manifested, not merely in the right ear, but also in the left (into which not an atom of ætherous vapour had entered), considerable improvement of the power of hearing, which, however, as might reasonably be expected, was more considerable in the right, than in the left ear. After this period of time, much

too short for any improvement to be confidently expected, the right ear heard my watch at a distance of four feet, instead of six inches, and the left at a distance of two feet and a half, instead of six inches, by which the patient was enabled to carry on conversation with a facility to which she had long been a stranger. Even this facility, which the patients acquire from such an improvement of the hearing, generally makes them forget that they have not yet regained *perfectly* acute hearing; so that this, by most patients, is looked upon as an impracticable, ideal thing, and it is, in fact, unnecessary for almost all the social relations of mankind. Thus most patients suffering from nervous deafness, the complete restoration of whose hearing requires a very long period of time, usually stop half way, in the midst of the treatment, because they are satisfied with the improvement they have already obtained, as indeed they often may be.

Case LXV. Mr. Rosenfeld, thirty years of age, of a very strong, plethoric constitution, has suffered for several years from difficulty of hearing, in both ears, without tinnitus. Both the mother and sister of the patient hear very badly, so that an hereditary predisposition must be admitted. No distinct cause of his aural affection can be given. Hitherto he has done nothing for its removal, with the exception of dropping into the left meatus a mixture of opium and tincture of myrrh, which produced violent pain, and even spontaneous bleeding from the meatus. The membrana tympani was at the same time observed to be streaked with large blood-vessels. The right meatus I found was sound, and the left Eustachian tube permeable to air, but not the right; so that it was not till after several sittings before the air-press, that it became open, and continued so. This, however, did not produce any proportionate improvement in the hearing. The hearing distance remained, as at first, nineteen inches, and on the left side, only one line. Several weeks' use of the ætherous vapour-douche, by means

of the large apparatus, in consequence of its mild action, was productive of no result. I therefore had immediate recourse to decomposed ætherous vapour, by means of the small modification of Itard's apparatus, and after continuing the treatment for four weeks, was pleased to find that the hearing distance of the right ear had increased from ten inches to four feet six inches. The left ear still remained unaltered. Notwithstanding this extraordinary advancement, the treatment could not be persevered in, as the patient was obliged, in consequence of mercantile affairs, for a time, to leave Berlin.

CHAPTER IV.

OF EAR TRUMPETS.

From the neglect with which many patients treat the diseases of their ears, and only apply for aid when the time for all aid is past; from the complete impossibility of affording the desired assistance, in many organic diseases of the ear, even when such assistance is sought for in proper time; from many diseases of the ear, which by timely and proper treatment might really have been cured, being artificially rendered incurable by the errors of medical treatment, which are still so frequent; and finally from a sort of paralytic debility of the auditory nerve that frequently occurs in advanced age in the course of the natural consumption of the vital energy, and against which it would be quite useless to oppose any remedial efforts, it becomes a most important desideratum, to supply by mechanical contrivances, the place of that animation, which cannot be restored to the affected organ even by the best efforts of medical art.

For centuries, great pains have been bestowed on the construction of such contrivances, but in spite of all the artifices that have been employed, the object is almost as far as ever from being attained. From the great variety of these inapplicable instruments for hearing, it would be a perfectly useless undertaking to describe them minutely, and to point out their inefficacy. It will be sufficient to class together the most common ones, in separate categories, in order to bring them more easily under review, and criticise them with more accuracy.

All hearing instruments, whether they have a straight, bent, coiled, conical, parabolical, or any other form, whether

they be large or small, may be arranged either according as they are simple *conductors*, with a wide mouth to catch sound, collect it, and transmit it to the affected ear unaltered, in all its intensity, by means of a simple inartificial canal; or according as they are composed of a material, by which the *intensity of the sound is increased, but at the same time altered,* irrespective altogether of any adaptation that they may also possess for intercepting the greatest possible number of sonorous vibrations. The numerous and very variously shaped hearing instruments of this second class, have been manufactured of gold, silver, brass, copper, plate iron, bell-metal, shells, and other similar materials, whose vibratory power is calculated to augment the intensity of the intercepted sound. With such instruments, the object would have been attained, had a very strong sound been the principal, or the only thing required for those whose hearing is obtuse. This, however, is far from being the case. All these patients, especially the very numerous class who suffer from every variety of tinnitus, are very disagreeably affected by any strong sound, especially by any strong vibratory sound; even the human voice, when harsh and shrieking, is unpleasant to them; *if they are to understand the words spoken*, they must be uttered in a distinct, tranquil tone, and clearly enunciated. But even this intelligibility is either altogether lost by the augmentation of the sound produced by metallic and other similarly constructed hearing instruments; or else, the great effort that is necessary in order to decipher and comprehend the words made to sound too loud, is such as over-excites the auditory nerve to so great a degree, that it only becomes so much the sooner paralytic. This over-excitement it is not possible to avoid, chiefly because we are not able so to construct the hearing instruments, that the intensity of tone given by them shall be completely adapted to the excitement required in particular cases, and to the capability possessed by each ear for enduring excitement; a degree of accuracy which, as regards spectacles for weak eyes, is readily attained.

In vain has Itard endeavoured to obviate the disadvantage occasioned by the vibrations which his ear-trumpets give to the tones they transfer, by stretching obliquely across one, or even two parts of the canal of his instrument, a piece of goldbeater's skin (*a*). The tone is, indeed, by this means diminished in acuteness, but it gains as little in distinctness, so that we thus are in possession of an additional instrument, but not of a better.

The same may be said of Dunker's hearing-tube with the metallic cup, so that even the few patients, who in this instrument perhaps meet with the desired alleviation of their deafness, should seriously reflect to how great danger they expose the already debilitated auditory nerve, by the use of this contrivance. Patients always find, after the use of such an instrument, which renders tones more acute, a troublesome straining and tension of the ear, by which an equally decisive warning is afforded, as by the troublesome tension experienced in the eye after the use of a too strong glass. The danger is not equally great in those cases in which the difficulty of hearing depends, not on debility of the auditory nerve, but on organic destruction of the external or middle ear.

In my opinion, the instruments best for all patients suffering from diseases of the ear, are those which are merely simple media for conducting and concentrating sound, of which the conducting tube of Mr. Dunker of Rathenow may serve as a model (*b*). For this Mr. Dunker has taken out a patent, as for an invention. It is a simple elastic tube, the small end of which is introduced into the ear, and the other, provided with an ivory funnel, serves for the reception of sound; the length and flexibility of the tube facilitates the intercourse of the person making use of it, even with individuals seated at a distance, and collects the sound in such a manner, that even a very low voice becomes more intelli-

(*a*) Traité, ii. p. 88.

(*b*) Beschreibung u. Anwend. der Hörmasch. mit biegsamen Leitungsrohre. 1829. Rathenow bei Flick.

gible, than words spoken close to the ear in an elevated tone.

Unfortunately, however, this excellent conducting tube only serves to carry on conversation with a single person; but patients who can no longer carry on such simple conversation, are much more rare than those who are unable to take their part in the conversation of a large circle, and in this they are not assisted either by the funnel-shaped, or by the metallic cup-shaped piece attached to the end of Dunker's conducting tube; though in particular cases, on first using this last contrivance, it seems as though the desired effect were gained. Very few patients, however, make up their minds to employ even the simple conducting tube, notwithstanding its great utility; simply, because it is too much trouble for them to take the instrument into their hand, in order to understand every particular word.

Finally, when the difficulty of hearing has become so great, that even a loud voice is no longer intelligible by means of the conducting tube of Dunker, as a last resource we may endeavour to conduct the sound through the bones of the head. In this case it is difficult, and of little use to adopt the plan of speaking to the crown of the patient's head, closely shorn, and rubbed with a volatile ointment. The method recommended by Jorrissen (*c*) is, perhaps, more easily put in practice. This consists in directing the patient to place between his teeth one end of a wooden stick of a peculiar construction, whilst the person speaking in like manner takes the opposite end between his teeth, so that the words spoken pass along the wooden conductor and arrive at the auditory nerve through the teeth and cranial bones of the patient. Itard has endeavoured to remedy the great inconvenience of this contrivance in a twofold manner; on the one hand, by substituting a speaking trumpet for the wooden stick, and on the other by having that end of Jorrissen's stick which the speaker holds in his mouth, cleft, so that the divided parts by their elasticity may be separated

(*c*) Diss. sistens novam methodum surdos reddendi audientes. Halæ, 1757.

to the extent of two inches from one another, and be kept in contact with the teeth of the speaker, however widely his mouth may be opened for the formation of particular words (*d*).

Itard, however, appears to have made no use of these improvements, for after all the inconvenience attending their use, they do not greatly facilitate oral intercourse.

The noblest aim of the practitioner, and that which is most certainly attained, is in every case, first to induce patients to apply in good time for assistance, by combating old prejudices, and adopting a rational mode of treatment, and secondly, to afford those who do apply for assistance, all the aid of which their disease is in any way susceptible; by which means the deficiency of good hearing instruments, will be much more rarely felt than it has hitherto been.

(*d*) Mr. Swan, in a paper contained in the ninth volume of the Med. Chir. Trans., has attempted to show, that sound is not conveyed through the bones of the head, but through the medium of the facial nerve, and thinks that where deafness does not depend on disease of the auditory nerve, important aid may be derived by taking advantage of this function of the facial nerve. (Tr.)

CHAPTER V.

OF DEAF-DUMBNESS.

It is not my intention here to consider deaf-dumbness as the object of the tutor's attention, (whose aim it is to bring the deaf-dumb into a state of cultivation approximating as closely as may be to that of those who hear, by means of their sense of sight, and by speaking with the fingers, either with or without the collateral assistance of any remains of the faculty of audition which they may still possess;) but merely in those instances in which it is the result of distinctly recognisable disease of the ear; and thus to estimate how far it may be avoided or cured by the timely and appropriate treatment of these diseases.

When a child, as the result of congenital defect, or of a subsequently developed morbid condition of the ear, either never acquires the full development of its hearing, or loses to such an extent its hearing hitherto sound, that the speech of those about him is either not heard at all, or at least only by listening with the greatest attention, (and which from the effort required is soon neglected,) dumbness is the inevitable result, that is to say, the child either does not learn to speak at all, or again completely loses that degree of speech which had been already acquired, for want of more ample and constant practice; he forgets one word after another, and, at the utmost, retains only some unintelligible fragments of words, which scarcely remind those about him of what he once possessed. The effort which is associated with listening, and the disagreeable sensation produced in the diseased ear by loud speaking, would alone baffle the attempt which it has been proposed to make, viz. to address to the ear of a child, who still evinces that he has some slight

power of hearing, in as loud and intelligible a tone as possible, throughout the day, as many words as it is necessary for a sound child to hear, in order to learn to speak. This extremely difficult task would never be successful, in preserving, for any length of time, fluency of speech in a child who has lost his hearing entirely, or to a great degree, in his seventh or eighth year of age.

Among the causes which act so perniciously on the organ of hearing during early life, that the development of the faculty of speech does not take place in the usual way, original defects of conformation stand pre-eminent.

In the strict sense of the term, this cannot be called hereditary predisposition, for as yet no instance is known of deaf-dumb parents having produced deaf-dumb children, and even in the instances of deaf-dumb children of parents whose hearing is obtuse, it is still quite undecided whether the organic defects of the parent's ears have been transferred to the children. Most frequently, the parents of deaf-dumb children hear perfectly well; in this respect nature often observes the most strange and inexplicable laws of formation, for the determination of which we have no data.

In place of many similar instances, I may merely detail one which comes under my notice every day. A man and his wife, of the name of Hartness, of this place, both of them healthy, and having no hereditary predisposition to any disease of the ear in their family on either side, have five daughters and six sons; the latter were all born deaf-dumb, whilst the daughters, without exception, hear perfectly well. The mother of these eleven children is not aware of any circumstance that distinguished her pregnancies from each other, though the children are so remarkably differently endowed. She was always healthy and active. One of their children has married a deaf-dumb girl, but their marriage has been childless.

Interesting conclusions might probably be derived, had we an opportunity (*e. g.* in this family of Hartness) of examining, with the necessary accuracy, the organ of hearing, not only in all the six deaf-dumb children, but also in the

girls, who hear perfectly, and of comparing the results with each other. Without such a comparative and very thorough investigation, it is perfectly useless to record (*a*) that in one man, whose hearing with the left ear was obtuse, and who had begotten three deaf-dumb boys, and two girls whose hearing was good, the cochlea on the left side was found much diminished in size, and the cavity of the tympanum equally small. This statement of what was found after death, would only be of importance, if the same had been observed in the deaf-dumb sons, and not in the girls, who heard well.

Equally obscure and unimportant are all the pathological changes that have been found, partly in the brain in the course of the auditory nerve, and partly in the labyrinth; *e. g.* its obstruction with gelatinous matter, and softening of the auditory nerve, &c.

Whether the absence of the incus, and the unnatural smallness or largeness, or immobility of the ossicula auditûs in general, &c., are or are not causes of deaf-dumbness, is still very doubtful. Nor is it of any use for the physician who is to give an opinion as to the curability of a deaf-mute, to know whether the hearing have been lost in consequence of metastatic inflammation and suppuration, from small-pox, scarlatina, measles, &c., or whether it have taken place after convulsions, colds, or irritation from worms, &c.; though hitherto the greatest importance has been, very unjustly, attached to these etiological circumstances, which, after all, have but a remote influence. These would only be decisive if deaf-dumbness were of itself an independent form of disease; whereas, on the contrary, it is the result of very various diseases of the ear, the peculiarity of which must be established in each particular case, if a decided and correct opinion is to be given, on what the deaf-dumbness really depends.

It may, therefore, be asked, what are the diseases of the external, middle, and internal ear, which occur in the deaf-

(*a*) Rudolphi Physiol., ii. i. §, 302, Anm. 2.

dumb, and what is the condition most frequently met with in these diseases?

But we are without the requisite data to answer these questions satisfactorily, so that it is still quite unproved, though it is not altogether improbable, that paralysis of the auditory nerve is, in most cases, the cause of the deafness on which the dumbness depends (*b*). Complete paralysis of the auditory nerve, that is, an entire incapacity to perceive any sound, is very rare. All the pupils of Pfingsten, an instructor of the deaf-dumb, could hear the strokes made with a small stick on the top of a box, behind their back, at a distance of one or two paces; most of them heard the sound of a violin, or a harp, on striking the strings with the finger, and also the letter A, when uttered in a loud tone behind their back (*c*). Similar results were obtained in the deaf-dumb institution of Paris, though Itard asserts that half the pupils in that institution had been completely deaf.

If from these facts we are doubly induced to attempt the restoration of the hearing of deaf-dumb persons, in order, along with hearing, to enable them to speak in a natural and more easy way than by the methods of instruction hitherto adopted, which, though indirect, are very complete, we meet unfortunately with the greatest and most invincible obstacles.

These obstacles do not perhaps so much arise from the defective accounts (*d*) which are given, in every case without exception, as to the origin of the deaf-dumbness in each particular instance; and still less from our not knowing which ought to have the preference of all the many remedies and methods of cure that have been empirically recommended for deaf-dumbness, for they must all be unhesitatingly rejected; but the difficulty lies here, that the auditory nerve, though it may not have been primarily affected, yet in all deaf-dumb persons, sinks into so important a state of

(*b*) Itard, Traité, ii. p. 405. (*c*) Nordisch. Archiv., ii., p. 729.
(*d*) Schmalz, kurze Gesch. u. Statist. der Taubstummenanstalten.

secondary paralysis, in consequence of its having remained so long in a state of complete inactivity, that even the effectual removal of organic abnormal conditions of the organ of hearing, cannot exercise that beneficial influence on its function, which may be always expected on the restoration of the normal state of the organisation, in those who are simply dull of hearing.

But previously to investigating whether, amidst so many disadvantageous circumstances in general, a rational mode of medical treatment for deaf mutes be still admissible; and, in that case, what sort of treatment it must be, I am anxious to endeavour to justify the sweeping criticism that has been passed on the empirical treatment of these cases.

Schmalz has collected all the so-called cures of deaf-dumb persons that he knew of, from Le Bouvier-Desmortiers, Mücke, Pfingsten, Castberg, Itard, &c., of which it so happens, that, with the exception of the three cases taken from Itard, they have all been confirmed merely on hearsay reports, and in no way by the individual observation of the relators. But even the three cases treated by Itard are of no decisive scientific importance, for his treatment of them was not preceded by any thorough investigation of the ear. No prudent, benevolent physician, however, will, without this investigation, attempt to cure a deaf-dumb patient of his malady by means of the moxa or the actual cautery, when he hears, that out of fourteen so treated, only one was improved by the treatment; and still less will he torment such patients with blisters over the whole ear, and caustic applications behind the angle of the lower jaw, when he learns that this mode of procedure was followed by any success only once out of forty-one times that it was tried, and that perforation of the membrana tympani in like manner succeeded only once out of the fifteen times that the operation was performed (*f*).

But after Itard's confession, that even these three deaf-dumb patients, who were improved, *never learned to speak properly, that their hearing always remained feeble,* we feel

(*f*) Traité, ii. pp. 460, 462, 464, 467.

less than ever disposed to repeat this more than rash treatment, undertaken without any rational end in view. He states that one of the three children did indeed enunciate some words, but *continued half deaf-dumb;* that the second child heard perfectly (?), but only began to speak when it returned to its parents, where Itard *hoped that it would learn to speak perfectly;* that the third child repeated with some effort the words which it heard, but died *before any conclusion could be come to,* whether it would have learned to speak properly or not.

Curtis merits not the least credence, when he, who possesses no knowledge whatever of investigating the ear, and even gives no account of what he calls his method of cure, professes that he has cured three deaf-dumb patients, one of whom had attained his seventh year of age (*g*). The rest of his cures of deaf-dumb persons are equally worthless (*h*). As a specimen of how little reliance is to be placed on him, I will give the words in which he characterises these cures; one deaf-dumb child, two and a half years of age, that was cured, "by means of an ear-trumpet could perceive sound easily and distinctly;" in a child five years of age that was cured "he hoped for the best results;" a girl, five years of age, has (brief enough!) again acquired hearing and speech, &c. &c. All these cures are said to have been accomplished by means of emetics, but they are only cures in the estimation of so credulous an individual as Schmalz, who, without examining them more closely, adduces them as facts.

The high recommendations that have been lavished on perforation of the membrana tympani for the cure of deaf-dumbness, rest on an equally frail footing. Deleau (*i*) relates eighteen cases, in which he has performed this operation on deaf mutes, but unfortunately, without having previously investigated the ear, and consequently without having obtained any decisive success, unless we choose to rest satisfied with slight indications of the faculty of hearing, which, indeed, might readily be made available as results.

(*g*) Clinical Report, &c. 1830, pp. 36—38.

(*i*) Mem. sur la Perforation, &c. (*h*) On the Deaf and Dumb.

Several of those that were operated on, "would have been very much better," "he himself had the best hope," but—either the patients, or their parents, had no patience, no perseverance, or they took no care, are the excuses given, together with every other possible one of a similar kind. The best proof of how little benefit is to be expected from perforation of the membrana tympani in these cases, is afforded by the fact, that during the last thirteen years, Deleau has never again had recourse to this operation with the above mentioned curative intention.

The persons operated on by Sir A. Cooper, were not deaf mutes, and therefore the apparent success obtained cannot be adduced on this occasion.

Electricity, galvanism, mineral magnetism, setons, and all the other empirical remedies, adduced one after the other by Dr. Schmalz, I may pass over in this place, and refer to what has been already said respecting them, at the close of the first part.

I turn now, therefore, to the most recent, and indeed rational methods of cure, in this department.

Deleau, in particular, has availed himself freely of the air-douche in the treatment of deaf-dumbness, but very properly, only in such cases in which a careful investigation of the ear had proved that mucous engorgement of the Eustachian tube and cavity of the tympanum existed. If both were free, he declared the disease to be nervous and incurable.

1. The greatest *éclat* was excited by the cure of Honoré Trézel, though this was principally in consequence of the great length at which Deleau's vain-glory induced him to give the case to the public (*j*).

Trézel heard with the left ear, after Deleau had professedly introduced his elastic sound into the boy's left tympanal cavity, which, however, by the way is quite impracticable. The next time, after the catheterism, this degree of hearing consisted in his being able to count the strokes made by striking on a hat, and in his being attracted by music. A

(*j*) L'Ouïe et la Par. rend. à Honoré Trézel, 1825, p. 20, et seq.

long time subsequently he had learnt to utter a few connected words, but with regard to this, Deleau never alludes to the very important question, how he had learnt to do so.

A month after the operation, according to Deleau's own confession, Trézel had made but little advancement in his hearing, he could only understand the vowels, and a few consonants. It was only in the second month that his ear could catch the syllables "that one addresses to little children." Four months later, he could on no occasion distinguish the direction from which the sound came when his name was called out. Even many months later, his voice was still very uncouth. It was only eight months after the catheterism, that he could say by heart a short fable "The Fox and the Crow," and how did he say it? He then only pronounced the syllables when they lay written before him, but not when he had to repeat them purely by his hearing alone; so that his sight evidently did more for him than his hearing. After the treatment had been continued for ten months, he could comprehend trifling commissions that were given to him, that is to say, however, those only that were given to him by *persons that he knew;* in this, therefore, he was again, in all probability, aided more by sight than by hearing. Five years after the operation, and when, therefore, he was fourteen years of age, it is merely said of him, that "he is able to receive instruction from those books, which are usually given to children of eight or ten years of age (*k*)."

But all this proves nothing whatever as to the restoration of the power of hearing in this deaf-dumb child; it merely shows the advancement that he made by the instruction given to him, which, from what has been stated above, was evidently received rather by the eye than by the ear. Even in this, his progress was very moderate, such as is frequently observed in the pupils of the deaf-dumb institution of Berlin, (the method of instruction adopted in which, Lachs (*l*), the

(*k*) Extrait d'un Ouvrage, &c., p. 25, note.

(*l*) Andeutung des Verfahrens beim Unterrichte taubstum. Kind. im Sprechen, 1835.

head master, has published a very clear and interesting account of,) and in a much greater degree, *simply by means of sight and without any attention being paid to the hearing.* I cannot describe with sufficient spirit the impression made on me by a pupil named Eppner, sixteen years of age, who, by his own confession, could hear no other sound than that of the letter A, spoken in a loud tone. This pupil was nearly six years in the institution, spoke with an extremely good voice, read perfectly well any book that was put before him, wrote distinctly and beautifully, and possessed such a facility in understanding words by means of the speaker's lips, that I could readily communicate with him by speaking, so long as I articulated the words slowly and distinctly, though it was quite immaterial in what strength of tone I spoke, for Eppner could not hear any thing. All this progress he had made simply by a methodical use of the sense of sight, without any collateral assistance from hearing.

2. Another deaf-mute that was also treated and instructed by Deleau in the same way as Trézel, after four months, was able to read and to pronounce all the modulations of the French language. What became of the patient afterwards, we are not told. I must here remark, once for all, how readily, among other phrases, Deleau makes use of the expression "delicate hearing;" he speaks of the delicate hearing of a deaf-mute, who is said to have heard the sound of a small bell (*m*).

3. A third deaf-mute, after having the douche introduced into the cavity of the tympanum, (that is to say, in the period that elapsed between Jan. 1828, and June, 1829,) could hear the noise of a waggon, &c., and could understand and repeat distinctly all the elementary sounds of the French language. By persevering instruction she *advanced so far* as to learn to spell. So that Deleau thus leaves us to hope what might be the result, but what actually became of her, up to 1834, we learn nothing from any of his writings (*n*).

(*m*) Rév. med. et jour. de Clinique, 1827, Fevrier.

(*n*) Rap. addressé aux Membres de l'Administ., &c., p. 5.

4. Nozaret, a fourth deaf-mute, previously to Deleau's treatment, could hear a loud noise, and tones uttered in a very loud voice. The treatment was commenced in 1829; and in the year 1832, Deleau says of this person, (and to this he adds nothing in 1834,) that she hears the slightest noise, can read very nicely, and that he hopes at some future time, to render it a very remarkable case, if he is supported in his labours (*o*).

5. Philip de T——, a deaf-mute, who could only pronounce the word *papa*, was treated for a month by Deleau, and of this case he said in 1832, that the boy *would* readily learn to speak, that his enunciation *would* be perfect, but though he published the commencement of the history of this cure in 1834, and with much parade, he passed it by without stating whether the boy had really learnt to speak readily or not (*p*).

6. A deaf-dumb girl, named Haleton, could hear previously to the treatment, noises, and some tones of the human voice, and could even speak distinctly some words. Deleau took her under treatment in 1831, but without obtaining any success, "for the patient had been taken under treatment too late; had it been commenced *earlier, she might certainly have been relieved.*"

7. Daguenet, a deaf-dumb boy, previously to the treatment (in 1831) could speak, though indistinctly, and could read and write letters, though incorrectly; the treatment lasted for several months, and Deleau assures us (1834) that his hearing has become as good as can be wished; but of this he judges merely from the written accounts respecting the boy, who had been removed. These accounts, however, give a very different statement, for the mother's last account in 1832, merely states, that the boy's enunciation improves, that at present he speaks softly, instead of screaming as before.

8. A deaf-dumb boy, named Lebreton, spoke a little,

(*o*) Introd. à des Recherches, &c. (*p*) Idem, pp. 107, 112

before he was taken under treatment, he repeated short phrases, very indistinctly indeed, but had already even attended a public school. Deleau's treatment enabled the boy to hear a watch, upon which Delcau exclaims with great delight, "Is it possible now to doubt the result of the treatment?" The deaf-dumb boy was handed over by Deleau to a teacher in 1830, for the formation of his enunciation (though he could enunciate long before), but what progress he made in his enunciation we are not told, even in 1834!

9. Augustus T——, a deaf-dumb boy, previously to the treatment heard well, when he was spoken to very slowly. Deleau took the child under treatment in 1831; and in 1834 tells us nothing further about him, except that he speaks better than the two deaf mutes, the subjects of the 7th and 8th cases, which, however, proves nothing, for he could previously both hear and speak.

10. A deaf-dumb girl, of the name of Bardoulat, after an introductory treatment, by the aid of sight learnt to pronounce some words, or at least (!) syllables; at the close of the treatment, she had advanced so far (!) as even to be able to pronounce all the elementary tones of the language.

11. Constance Poron, during the first eight months of the treatment could never once pronounce the vowels; not till a year after the commencement of the treatment could she spell, which the pupils in the institution of this city learn to do in two months at the latest.

12. Jules was soon able to spell and to read; but he lost his hearing, and learnt to speak only by means of his sight.

13. Edw. G——, previously to the treatment, could only hear very loud tones at a certain distance; after the treatment he could read, speak well, and at length even conversed with Dr. Amusat, which, however, proves nothing as to the restoration of his hearing, for a deaf-mute, without hearing, can keep up a conversation with a person speaking, an example of which I have given above.

14. Charles P. was declared incurable.

15. Benjamin Dubois, also, but he was instructed, that is to say, he learnt to speak without hearing.

From these results, amounting to absolutely nothing, and comprising all that Deleau has made known on the subject, the French institute accorded to Dr. Deleau the sum of 6000 francs annually for the instruction of four deaf-mutes, of whom Dessault and Eugene le Comte are pointed out, as early as 1826, as remarkable for the delicacy of their hearing and the clearness of their enunciation. But nothing more is said in any of the writings published by Deleau up to 1834, respecting the progress or the termination of the treatment of even these two hopeful deaf-dumb pupils, that were so vauntingly mentioned. It must, therefore, be considered as a remarkable fact, that an institution so renowned for the cure of defective speech, should, for a length of time, have allowed an interested man to keep up the most inconceivable deception, and continually derive from it large sums, not only without any results accruing, but even without affording the most distant hope.

After this complete statement of all the accounts of deaf-mutes that have been said to be cured, I may venture to declare, distinctly, that hitherto *no single deaf-mute has been cured;* that is to say, *has been rendered capable of communicating, like a person who hears well, with his fellow men, in an unrestrained manner, by means of hearing under all circumstances.*

The problem, so important for all mankind, whether deaf-dumbness be curable, is, therefore, practically as yet unsolved; affording sufficient reason for doubting whether it ever will be satisfactorily solved in the affirmative.

The hearing of a watch, or of any other noise, by deaf-mutes, has been the source of the grossest error; a deaf-mute can learn to read and speak perfectly without hearing even a *single tone;* so that the only true test of the cure of a deaf-mute, is his being able to converse with a stranger as well without the aid of his eyes, as any person who hears well is daily in the habit of doing.

In order to set forth in all their disheartening importance the negative results which have hitherto accrued from all the efforts to cure deaf-dumbness, it must still be considered theoretically possible, that when deafness is caused by organic diseases of the external or middle ear, as they have been described above, the removal of these organic abnormal states, in the mode also already described, will probably exert a decidedly beneficial influence on the deafness, and thus on the dumbness, and the deaf-dumb, whose hearing has thus been restored, must then, undoubtedly, learn to speak in the usual way; unless,—either the auditory nerve, from the state of inactivity in which it has so long slumbered, have suffered incurable injury of its vital power,—or, the organic diseases of the external and middle ear are merely the morbid conditions appreciable by the senses, after the removal of which, the simultaneously existing functional affection of the auditory nerve, is rendered evident in all its insuperable extent, and baffles any attempt at curing the deaf-dumbness.

THE END.

Stevens and Pardon, Printers, Bell Yard, Temple Bar.

Fig. 7.

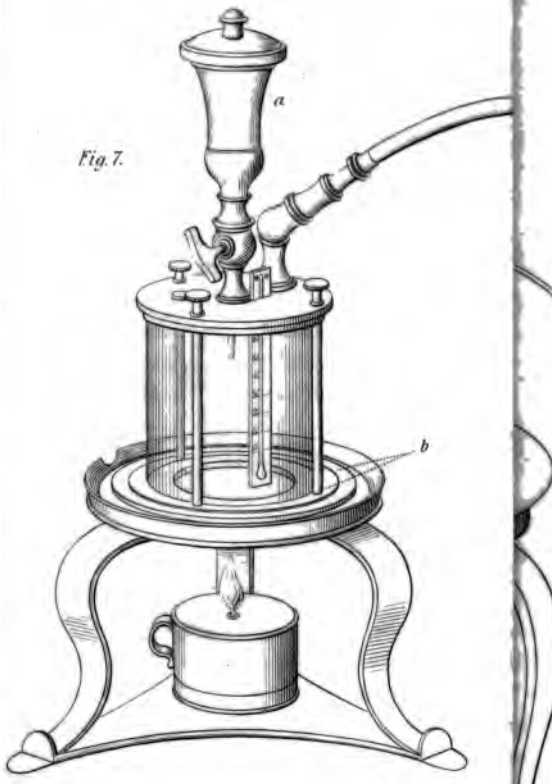

Fig. 6.

EXPLANATION OF THE PLATES.

PLATE I.

Fig. 1. The Speculum Auris . . . . . *vid.* p. 90.

Fig. 2. Lamp for the Illumination of the External Meatus . *vid.* p. 92.
a. The Concave Mirror.
b. The Reservoir of Oil.

Fig. 3. The Silver Inflexible Catheter . . . . *vid.* p. 191.

Fig. 4. The Frontal Bandage . . . . . *vid.* p. 192.

PLATE II.

Fig. 5. The Air-press . . . . . *vid.* p. 196.

Fig. 6. The large Vapour Apparatus . . . . . *vid.* p. 272.

Fig. 7. The small Vapour Apparatus . . . . *vid.* p. 288.